AMERICAN MACHINIST

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Small-Surface Grinding Machine.

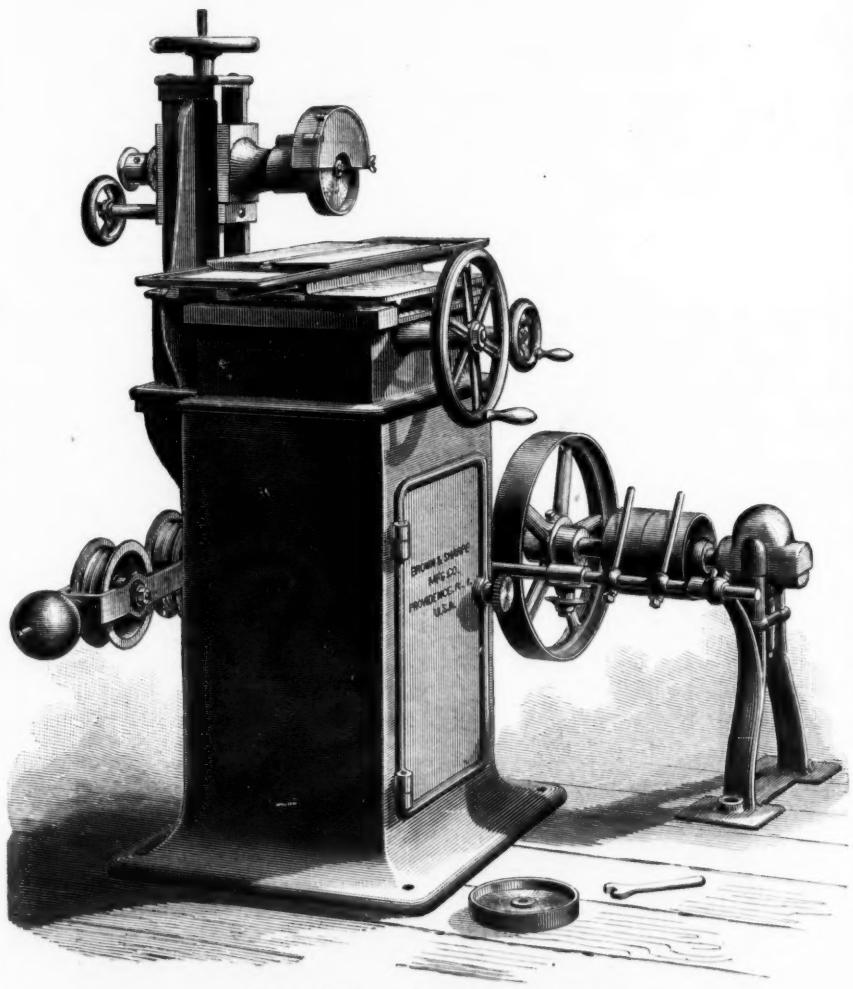
The illustration upon this page represents a new surface-grinding machine, which is intended not only for grinding and finishing hardened dies, punches, and other similar articles, but also many of the smaller tools and parts of machinery which require a bright, smooth, and true surface, such as is generally produced with files and emery cloth. When placed in the hands of an intelligent workman more and better work can be produced upon it than by the old method, and at an expense not exceeding one-quarter of that incurred by the old method.

The body of the machine is made hollow, so as to form a convenient tool closet, while the large base gives the machine a decided advantage in resisting vibration, thus making the quality of work done as perfect as possible. The table for holding the work slides upon ways, which are never uncovered by the motion of the table.

The dust and emery are thus excluded, and all annoyance from this source entirely avoided. A longitudinal motion is communicated to the table by means of the large hand wheel shown in front of the machine, while the cross feed is produced by turning the smaller wheel. The vertical adjustment is effected by raising and lowering the emery wheel by means of a screw and wheel at the top. The journals of the spindle are of a proper length, to prevent any tendency to get out of line. These journals are adjustable to compensate for wear, and covered to exclude all emery and dust.

The sliding head may be firmly secured at any point. A convenient belt tightener is attached to the machine, which always keeps the belt at a proper tension, regardless of the position of the head. In using an emery wheel of 6″ diameter, a piece of work, 5″ high, 6″ wide, and 18″ long, may be ground; and by fastening a pair of small planer centers on the table, the grooves of taps, reamers and other tools, may readily be sharpened and finished. The table is provided with receptacles for catching water, or any other liquid that may be used.

A counter shaft is furnished with this machine, which should run at a speed of 275 revolutions per minute, to give the grinding wheel the required velocity. The tight and loose pulleys are 6″ in diameter, and have faces 3¼″ wide. The weight of this machine complete is about 1,065 lbs. It is manufactured by the Brown & Sharpe Manufacturing Company, Providence, R. I.



SMALL SURFACE GRINDING MACHINE.

Extracts from Chordal's Letters.

Mr. Editor:

* * * * If I were smart enough to ask many such pertinent questions as my late one pertaining to polishing, and if the simple asking would bring so much information, I would have cause to consider myself a really useful member of the machine fraternity.

* * * * I am willing, and even anxious, to be useful, but in the meantime I must remember that it is always a good plan to let on as though I knew something myself.

As I have before stated, I never seemed born for a polisher; but at the same time I have, by experience, picked up a point or two in regard to the "principle and practice" of polish. For instance, I know very well, that the first thing to do is to get the shape; next, to get the pure, dead surface, then to polish the aforesaid dead surface.

I know of one trick, so rare as to be entitled almost to the dignity of a "kink." Take such a common job as the flat part of a cylinder head, for instance. My own plan was to take two or three roughing cuts, first in and then out, until the thing was brought near to dimensions; then to take a very sharp and very broad-nosed tool, at a very slow speed, and put it over the work with a very coarse feed, so as to get through quickly without giving the tool time to get dull. This operation leaves the surface as true as it is possible for that lathe to turn it; and it is on such a surface that most lathesmen commence their work of scraping and rubbing, &c.

I never found out the use of a scraper on such flat jobs as the one mentioned.

If the surface, as left by the broad-nosed tool, be closely examined, it will be found to be a very true surface; but that the iron has been torn out, instead of being cut off smooth. The surface will be found very rough, and porous and black. The broad-nosed tool did very heavy work, notwithstanding the lightness of cut. The usual operation of scraping is intended to re-cut the surface in such a way as not to tear it.

Scraping is high speed work. All cast iron will tear at low speeds. The broad-nose coarse feed plan is a slow speed plan, and, consequently, a tearing plan.

My own practice was to use another broad tool, after trueing things with the first one. The tool should be very much keener than the common tool. A very keen side tool is the best. It should be very nice, have but little clearance, and should be perfectly fixed up with an oil stone.

This tool should be set to take the most delicate cut, the lathe should run at high speed, and the feed should be *very* fine. Notwithstanding the fine feed, this tool gets over the work very quickly, owing to the high speed; and, owing to the high speed, it cuts instead of tearing. The result is a surface as bright and pure as cast iron can be finished by any tool, be it scraper or anything else, and is ready for polish.

To those who have never tried it, the thing is a revelation.

It takes some practice to get the swing of the thing.

The keenness of the tool, its clearance, its temper, its amount of bearing, its cut, the speed, and the feed, all require a little experience, but are easily got at by practice. The first attempt will generally show up so well, that the average lathesman will take pains to master the thing.

This plan will only apply to such narrow surfaces as cylinder head faces, &c.; a broad surface would dull the tool, and it is almost impossible to re-set it.

For unpolished surfaces, such as packing ring edges, &c., it is just the thing.

Coarse feed, slow speed, light cut to get things true, and a high speed, light cut, and fine feed to get this true surface smooth.

* * * * Not very long ago, in a letter to you, I expressed myself on the matter of Universal machines, or machines which will do most any kind of work, if you only go to the trouble of rigging up the attachments.

In the machine shop, for instance, there are certain kinds of work which must be done by machinery, in order that the work may be properly done. In such cases the expense need not be considered.

As an example of a job which must be machine made, we can take a common cut gear. If a fine toothed cut gear is to be replaced there seems to be no way of doing the job except by some machine process of tooth cutting. There is hardly any imaginable grade of hand work that would yield even a passable job of cut gearing. As far as the cost is concerned, a skilled viseman will chip out and file up a pinion in less time than it can be done in any machine, except a gear cutter, but the job will not be good and cannot be made good. About one shop in six hundred has a gear cutter, and every shop is compelled to cut a gear once in a while.

When the gear-cutting job comes along, it is found that it must be a machine job, and it is also happily found that there is an attachment for the planer which will be just the thing for the job. I refer to the planer centers. If planer centers were only adapted for gear cutting the average shop would not get their value back in an age. The centers are hunted up and put in shape. The dial may not divide properly for the gear, but that is a matter which is easily arranged by hunting up some gear to serve as an index. There may be some scheming required, and some little tinkering to be done in order to get things to answer, but after a while the gear gets cut, and in all probability it will be a good job, unless it happens to be in a railroad shop, in which case the new gear will always be made of brass, and as a consequence won't be good for anything.

* * * * In this gear job we find that a pair of planer centers becomes an almost indispensable attatchment to a planer. It would look as though universal qualities in some machines were not essentially a humbug after all.

My own opinion is that whether a device or attachment, or convenience, for use in a common ordinary shop is a humbug or not, is a question to be judged first by its measure of indispensability on certain kinds of work, and next by the frequency of its application.

In the matter of planer centers, we can see that they are of weekly use on work which can hardly be done without them.

* * * * Notwithstanding the great utility of planer centers, they are very much abused by honors to which they are not entitled. The same with shaper centers, of course.

Take a common flat wrought iron handle crank, for instance. Most all shops have something of this kind on hand once in a while. Maybe such a crank as I have mentioned is a link, maybe it is a hubbed lever.

The usual plan is to bore the hub, put the job on a mandrel and do as much lathework as possible; then put it in planer centers and run around the edge, and then take it to the vise for final touch.

These things never come in lots in com-

mon shops. There is but one piece. The truth is that the planer centers, as applied to this job and to odd jobs of this sort, are a humbug. Any viseman, worth his salt, can get away with this kind of a job in half the time it takes to get the centers on the planer, and he will do the job every bit as perfectly, too, because its neatness and nicety depend on the vise work in the end.

On such jobs as this, ten minutes with a cold chisel will do the same work which it takes the planer two hours to do. It always worries me to see a thousand-dollar shaper or planer nibbling at the black edge of a single little hand crank, or something of that kind, when I know very well that the centers had to be fished out of some hole, and wiped up, and repaired temporarily, perhaps, and a special tool dressed, and the rig fixed in place, and all such business, when five minutes chipping would have done the job every bit as well as all this fussing.

* * * * When planer centers are wanted they are wanted badly; they are an indispensible tool, and no planer is complete without them, but common sense should tell when it is wise not to use them.

Very respectfully,

CHORDAL.

According to the *Railway Age*, there is a project to build a railroad from Walena, Minn., on the Northern Pacific, west to Fergus, 55 miles, and thence to Breckenridge and James River Valley, Dak., a total distance of about 150 miles; thence connecting with the Chicago & Northwestern and Chicago, Milwaukee & St. Paul roads; also from Detroit on the Northern Pacific southwesterly to Fergus, 48 miles. These two lines form at Fergus a triangle enclosing nearly 1,000,000 acres, containing the finest board wood timber in the State. It strikes the Northern Pacific twice, crosses the St. Paul, Minneapolis & Manitoba twice, and intersects the Chicago and Northwestern and Chicago, Milwaukee & St. Paul in the James River Valley. The contract for building the nearly 200 miles has been taken by the Minnesota Construction Company, of St. Paul, which takes pay half in preferred stock and half in bonds. The capital stock is $500,000, and the bonded indebtedness will be $8,000 per mile. The construction company leases the road for four years after completion. The company will operate a line of steamboats on the numerous beautiful lakes which abound near the line. The surveys are being made, and it is expected to commence construction both at Wadena and Detroit in the spring, and to reach Fergus and Breckenridge during the year.

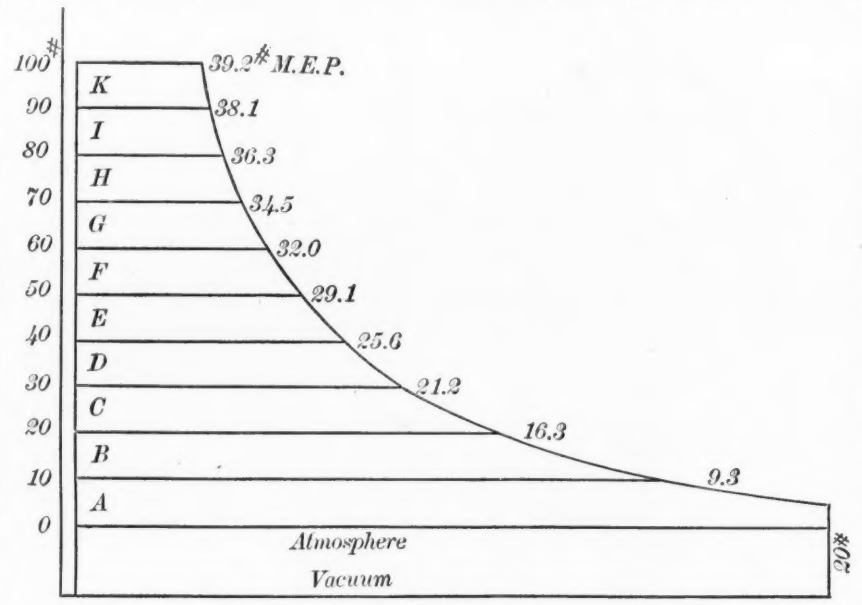
Advantage of High Steam.

BY WM. LEE CHURCH, C. E.

I have thought it well to introduce a diagram, illustrative of the reason why the use of high pressure steam is economically advantageous. The consideration of the subject is theoretical, and is intended to show the principle involved, and towards the complete realization of which we may approximate.

I have endeavored to show in former articles that the measure of the economy of an engine is the steam rejected, *i. e.*, the terminal pressure. We will assume a constant terminal pressure of 20 lbs. above vacuum. Having, therefore, a pressure of 20 lbs. to throw away at the end of each stroke, it becomes merely a question of how much work we got out of it before we threw it away; and that question is simple.

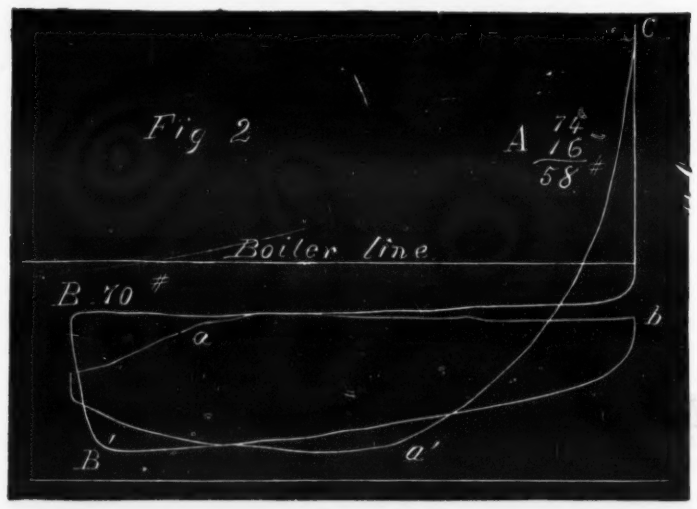
Suppose our initial pressure was 10 lbs., and disregarding compression, we should realize an amount of work equal to the band *A*, or 9.3 lbs. mean effective pressure (M. E. P.), since the figure would be a theoretical indicator card for that initial and terminal. If, now, we raise our pressure to 20 lbs. initial, we get an additional amount of work represented by the band *B*, for nothing, and our M. E. P. is now 16.3 lbs., an increase of 76%. Raising our pressure to 30 lbs., we get the addition of the band *C*, giving us a total M. E. P. of 21.2 lbs. In like manner, every increase of 10 lbs. gives us its corresponding amount of additional work for the same terminal pressure, *i. e.*, *for the same amount of steam expended.* It will be noted, that the amount of work added for a given increase of pressure grows smaller as we approach the higher pressures, which would indicate that there was somewhere a good place to stop, or at least that there was a point where the gain in power would be balanced by the increased risk, greater strength of parts required, dangers from higher temperatures, &c. And we might remark in passing, that, as engines (single cylinder) are now built (and as people are now prejudiced), it is probable that 100 pounds pressure represents about the limit of good and politic practice.



Or, to look at it another way, we will compute the water consumption due to each 10 pounds variation of pressure, by a method heretofore given in these columns.

We will tabulate the results thus:

Initial Pressures.	M. E. P.	Lbs. Water per H. P.	Gain of Power.	Economy of Fuel.
10	9.3	75.3	per cent.	per cent.
20	16.3	42.9	.76	.43
30	21.2	33.0	.30	.23
40	25.6	27.3	.20	.17
50	29.1	24.0	.14	.12
60	32.0	21.9	.10	.09
70	34.5	20.3	.08	.07
80	36.3	19.2	.06	.05
90	38.1	18.4	.05	.04
100	39.2	17.8	.03	.03



The percentages of gain being reckoned from the next lower pressure preceding.

The effect of compression as an economizer has been purposely disregarded, since we wish to consider the effect of increased pressures uninfluenced by any extraneous corrections. Having illustrated certain results, we will, in another article, examine the causes from whence they proceed.

* * * * * * * * *

I am reminded that in the AMERICAN MACHINIST for January 10, 1880, I showed a very singular diagram, promising to explain it in a future number, and have thus far failed to do so.

I will beg the reader's pardon, and ask to have the cut re-printed. As stated, the diagram is from an automatic engine, and it won't hurt anybody's feelings if I say that it was from a Putnam engine, because the Putnam people were entirely innocent. The poppet valves of this engine are raised by lifters operated by cams. There are two lifters just alike which work the steam valves, and two more a little different in shape work the exhaust valves. It transpired that on a certain time this particular engine needed overhauling, and some country Jake undertook the job. It all went smooth enough while he was pulling it down, but when it came to getting it together again, he was in the same fix as the boy with the wooden clock—he got the right thing in the wrong place. In short, *he got both steam lifters on one end of the cylinder, and both exhaust lifters on the other end!* Note the effect. The right-hand card cuts off its steam all right at *a*, and it also *cuts off the exhaust* at about the same fraction of the stroke at *a'*, which causes the compression to shoot up to about double the boiler pressure—a little more than the most radical "compressionist" would advise. Consequently, when the steam valve opens, that end of the cylinder pumps a charge of steam back into the boiler. The left-hand card, on the contrary, sedately allows the steam to follow clear down to the latter end of the stroke at *b*, without any more attempt at cutting off than is seen on the exhaust. Result—a late release, enormous back pressure, and pretty bad economy all around.

Now, if there is any moral in this thing anywhere, it lies in the fact that the owner of this engine, after running in this condition for four years, quarreled with an indicator man, who charged him $25 for ten minutes work changing ends with the lifters. He was willing to pay $5 for the "time," but he kicked against the other $20 for the "know how."

A manufactory in Auburn, N. Y., has recently introduced a machine which makes 72,000 rivets a day.

Letters From Practical Men.

NEED OF NATIONAL BOILER INSPECTION LAWS.

Editor American Machinist:

Our new Society of Mechanical Engineers is to meet November 4. We are to have a paper read from our eminent brother, Prof. John E. Sweet. That alone will be advancement enough for one day, and I know all will say "Amen" to that sentiment.

There is one subject, however, that I would most respectfully present to each and every member of our Society. It is that of boiler explosions. These terrible calamities are now occurring with such alarming frequency that I, as an engineer, feel moved to call the attention of our new society to this very important branch of our study, as it, in my opinion, does require the most thoughtful study.

It seems to me that one of the early missions of our society should be to aim for, and procure, some substantial *national* legislation in this matter. We can no longer leave this vital question to the "slip-shod" ways of State Legislatures. Up to this date these august bodies have generally dealt with this question, involving human life and vast properties, with about the same consideration they bestow on a turnpike sign board. What we want is to have this matter placed under the protection of one of the present Bureaus at Washington, and have the rules and regulations enforced with the same vigor and impartiality as the collecting of our domestic revenue.

Let our society present this case (through a properly appointed committee) to Congress before the end of the next session, and when it is once before them let us push it to a successful termination.

WM. H. HOFFMAN.

PASSAIC, N. J., Oct. 25, 1880.

FORCE OF A BOILER EXPLOSION.

Editor American Machinist:

In your issue of October 30th is an article on the explosion of a rolling-mill boiler, in which the writer says: "The records show that boilers which explode with no water in them are not shot through the air like a rocket," etc.

In this I think the writer is mistaken. I was rather a "close" witness to an explosion, where it was known that there was no (or very little) water in the boiler, in which it *did* go like a rocket, and passed within ten feet of where the writer stood. Its flight, before it first touched ground, was about 400 feet; it then "ricochetted," and its flight was about 170 feet further, where it finally stopped. It was the largest rocket ever seen by the writer.

The velocity of its flight may be imagined when I state that the trajectory of the first 400 feet was so "flat;" that at no part was it more than eight or ten feet higher than the starting point.

C. W. COPELAND.

New York.

NOTES OF A FOREMAN.

Editor American Machinist:

Your valued journal has much to say concerning the duties and qualifications of the foreman. Your standard is an exacting one, and worthy the widest emulation. No foreman can be a diligent reader of your paper except to his advantage.

Yet, I doubt whether you say enough about the trials and perplexities to which a foreman is subject. Chordal has had no mercy upon the poor fellow either. If everything, or if anything, is not right in a machine shop, it is always in order to have a fling at the foreman. Well, I suppose that's what he's made for.

Now, I take it there may be some promise of mutual help in the enumeration of our various difficulties and of the means by which to overcome them. To speak my own experience with perfect freedom, I must, for the time, conceal my personality, otherwise I do not favor the anonymous.

It is scarcely possible to get together a better lot of men than I have to do with, yet my greatest trouble is, I suppose, one which every foreman experiences; of course, I mean the unreliability of men. The foreman has usually been first a journeyman, and comes to the more responsible position with an experience little qualifying him for the annoyance I am speaking of. Accustomed to operate a lathe or a planer, you set it going, and you know precisely what it will do; but you may give many a man a piece of work, and the only thing certain in the case will be that you do *not* know precisely what he will do. There is but one way to do a thing right; you may forewarn him of five hundred ways how not to do it, and the ingenuity of bungling will discover five hundred more. I sometimes think that there is no field in the world where the ingenuity of man is more conspicuously displayed than in the invention of wrong ways of doing things. Say that there are but two ways in which a certain piece can by any possibility be put into a machine, and that, apparently, the chances are even as to which way an ignorant man would insert it. Experience would convince you that there is nothing even about it. There are men who, with the chances thus apparently perfectly even, will, in ninety-nine cases out of the hundred, do it the wrong way.

I suppose that a foreman can never wholly escape this kind of thing, and he must always be more or less making compromises with it. Work is to be done, and it must be done with such help as can be got; among a shopful there must always be some bunglers. The foreman can only be as alert as possible. He must learn to gauge accurately the individual capacity of his men, and especially guard against a repetition of the same blunder by a man. Don't let a case become chronic. The limit of forbearance to be exercised, and the length of time a hopeless botch must be tolerated, circumstances alone must determine. Some tolerably reliable men are occasionally subject to bad streaks, and with such a great amount of patience may be proper.

A foreman will be apt to find himself dividing his men into two classes: those who think and those who do not, and between them there is a great gulf fixed. For certain positions, such as the unending repetition of a certain piece of work, the man who does not think may be the best, just as a mule is sometimes preferable to a horse. A man may learn to travel very steadily in some narrow routine, who would be constantly and hopelessly losing his way, if given a wider range. This makes the position of a foreman, in a shop which simply manufactures some staple article, much easier than that of one who has charge of a jobbing and miscellaneous business.

I do not forget the actual responsibility of a foreman for mistakes that occur. It is his business to see that everything is thoroughly understood, that all measures are explicitly given and recorded, that the connection of the piece in hand with the rest of the machine is comprehended, that no man is entrusted with anything that is beyond his capacity.

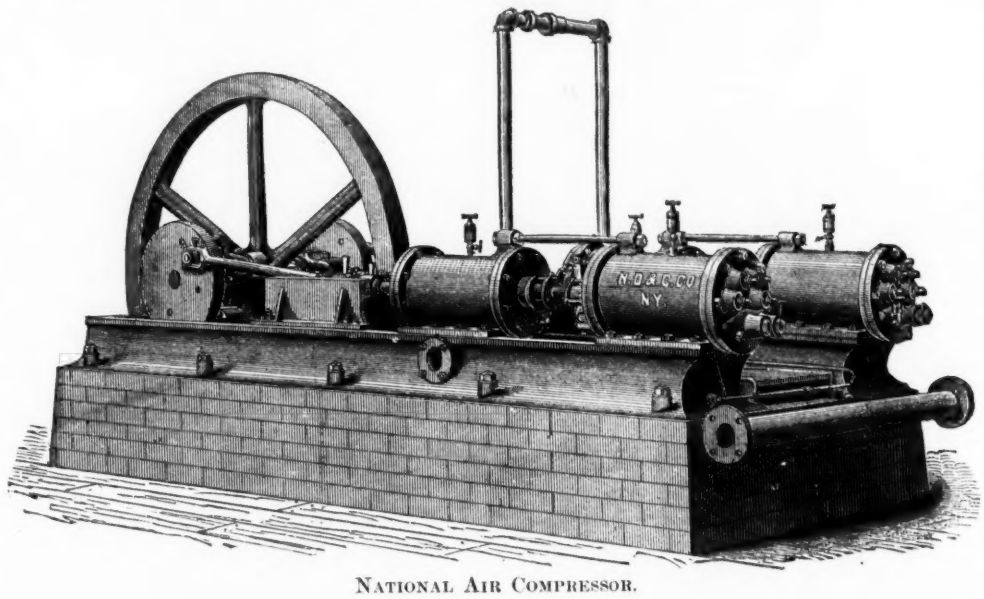
A foreman, to be of much value, must be a rather permanent fixture; and not only so, but he must learn to consider himself such, if he wishes to accomplish the best results. If a foreman comes to a shop as a stranger, it takes him time to get the run of the peculiar line of work in the shop, the special methods and facilities for doing work, and the aptitude and experience of the men he is to direct. As the *personnel* of the shop is from various causes always subject to change, he must look ahead and keep up his supply of skill and reliability as much as he must keep up the tools. In the endeavor to draw out and develop the best skill of his men, he must take some risks; but they are risks that pay, if directed with sufficient judgment.

Troy, N. Y., Oct. 25, 1880. *

The National Air Compressor.

On this page we illustrate a duplex air compressor. It is one of a class that is being generally constructed by machine builders, who furnish the necessary plant for mine owners, to construct machinery to drive rock drills, hoisting engines, pumps for breweries, compressing gas, and other purposes too numerous to mention.

It will be observed that the arrangement of the parts is very similar to the ordinary stationary steam engine. A box frame is made, upon which is mounted and secured a steam cylinder, cross-head slides, and main shaft pillow block. The frame is made sufficiently long to carry an air cylinder, the front end of which is separated a sufficient distance to get access to, and pack the piston rod stuffing boxes.



NATIONAL AIR COMPRESSOR.

One of the peculiarities of the air cylinder of this compressor is in the method of forming the water jacket for absorbing the heat, due to the compression of the air. The inner cylinder, in which the piston works, is cast separate from the outer cylinder or jacket, and has a spiral rib cast upon it of fine pitch, so that when it is fitted in and drawn into the jacket casing, a spiral chamber is formed, through which the water circulates for cooling the inner cylinder, and, consequently, cools the air that is being compressed in it. This makes a more efficient, but, at the same time, a more costly arrangement than where the water jacket and inner cylinder are cast together. The cylinder heads around the discharge valves are also water jacketed; in fact, the method of cooling the air is carried out on what is called the dry system, so that there is less danger or trouble from freezing where these compressors are used in cold latitudes, than where the air is brought in direct contact with the water to cool it.

The inlet air valves are of wrought iron, carried in composition seats. The discharged valves, of which there are only two at each end, are of cast composition, and are guided in bushes and held to their seats by spiral springs in the manner commonly adopted by most engine builders.

The piston springs of the air piston are made of bronze composition. The amount of clearance is reduced to the smallest possible amount. On the steam cylinder the common *D* slide valve is used, but where customers desire it, the manufacturers furnish a cut-off valve adjustable by hand; so that, with a wide open throttle, the steam can be cut off at any point of the stroke, suitable for the work to be done, and gain all the benefits to be derived from the expansion of the steam.

One of the main objections to machines of this type, is their lack of efficiency in the amount of useful work done in proportion to the size of cylinder at the speed they are guaranteed to run by their builders. We doubt very much if an air compressor of this style, or in fact any style that is at present in the market, can be run at a piston speed of 400 feet per minute, and show an indicator card that would fill all the requirements of first rate practice.

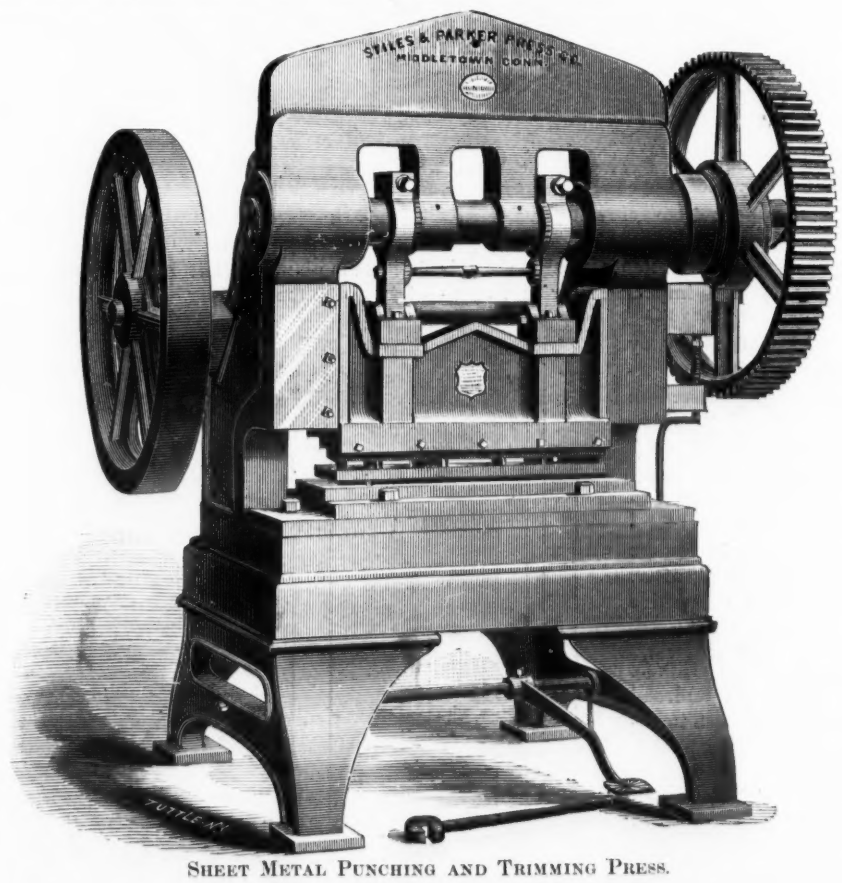
A simple, economical, light (that is the parts suitable for easy transportation in mining districts), and fast runnning air compressor, is much needed, especially in our mining regions. It is a problem that our air compressor builders, as yet do not seem to have solved, although it is a thing greatly to be desired.

All bright work on machinery is usually covered with white lead and tallow, as a preventive of rust, but the proportions of which the mixture is made are often mere guess work, so that when the machine arrives it is covered with a kind of cement that is not only hard to remove, but kills the finish and destroys appearances. An excess of tallow should be used, so that the mixture will rub off easily with a piece of waste.

Steam engine builders are, as a rule, pressed with orders. This state of affairs gives rise to new engines and new engine-building shops. We learn a new high-speed engine is soon to be brought out by a firm in New Jersey, and that a new compound engine is soon to be built and introduced by a well-known firm of this city. Compound engines for manufacturing purposes are attracting a great deal of attention just now from leading engineers.

There are more ways than one to keep a husband home evenings. The New York *Times* describes the domestic methods of a fond wife who put up a cask of beer in one corner of the dining room, covered the floor with sand, and hired two or three dirty fellows to fill the place full of smoke from vile cigars. A woman with any sort of tact can make home as happy and cheerful as a beer saloon.

Sheet Metal Punching and Trimming Press.



SHEET METAL PUNCHING AND TRIMMING PRESS.

The machine shown by the accompanying engraving was designed for adaptation to a general class of work. For example, where only a few sheets of iron or steel require to be punched for some special work, and where it would not pay to have a more expensive machine, this one is found to perform the work admirably. The punch holder of this machine, and the general arrangement, are the same as in the sheet metal punching machine which was illustrated in the AMERICAN MACHINIST of October 23, 1880, and will punch sheets 48 inches wide. The principal object of this machine is to trim and punch sheets and strips for carriage work. A stripper is attached to the dies, and acts as a gauge and guide. The punches may be located in any position by making more or less holes in the holder. When the holder is full of holes it offers the advantage of using a less number of punches when required. In working the punches never rise above the stripper. This can only be done by stopping the press and manipulating the cams, as described in the previous article referred to. When the cross head is placed at its lowest point, the machine cannot be started until the punches are again raised to their highest position, where they always stop.

On these machines it is impossible, in adjusting, to get the cross head out of line, as a double pitman is used, which is operated by an adjusting device correcting the two parts, thus insuring an equal lengthening or shortening of the connections. These machines are furnished with or without back gears, also with a counter shaft for securing different speeds. The design and workmanship are excellent. Tables for holding the sheets while passing them through the press are furnished whenever required.

These machines are made by the Stiles & Parker Press Company, Middletown, Conn.

All the machine works and iron foundries in Brooklyn are full of orders.

The "Perfection" Turbine Water Wheel.

For many years it has been held as the fundamental principle of turbine water-wheels, by those interested in their manufacture and use, that the turbine is driven by the water spurting through the openings in its case and impinging itself upon the buckets of the revolving wheel.

Almost all of the wheels now offered for sale are constructed upon this principle, and their builders take particular pains in so stating in their circulars.

It has been found by a few builders and engineers interested in this class of machines, that the above principle is entirely fallacious, and that water imparts its power to the turbine by the reaction in discharging from the bucket orifices and not by direct action. Instead of the water impinging against the buckets, the latter really move so much faster than the entering water that, unless some provision is made to prevent it, the wheel is actually retarded by the back of the buckets flapping against the inflowing water. The turbines made by the builders who design their wheels upon this latter principle have given the highest results in percentage of useful effect ever obtained.

Craig Ridgway & Son, of Coatesville, Pa., have, during the past summer, brought out a new wheel, constructed upon the principle of reaction, which they call the "Perfection." This water wheel contains some new and valuable features. The manufacturers have issued a pamphlet, in which they explain the principles of various turbines, and describe the "Perfection," from which we have selected the accompanying cuts and description.

Fig. 1 shows the turbine complete, ready for setting in its place and connecting to the forebay that supplies the water and to the machinery it is to drive. The wheel is shown lifted from the casing in order to show the shape of the buckets.

Fig. 2 is a horizontal section through the wheel, case, and gate-box.

Fig. 3 is a vertical section. That part on the right being a section through one half the wheel and case on the line 3, 4, and that part on the left being a section of gate-box and throat on the line 1, 2, in figure 2.

Similar letters indicate the same parts in both figures.

W is the gate box, which is bolted to wood or iron forebay or pipe. The water, which enters in the direction of the arrows, is controlled by the sliding plate *G*, which constitutes the gate, operated by rod *P*, passing through packing-box *K*.

The water passes around the circular waterway *O*, which is made to coincide with natural direction of motion of the water, and enters the buckets *B*, of the wheel *A*. The wheel is driven forward by the water discharging from the buckets, in the direction shown by the small arrows. The wheel runs with a circumferential velocity greater than the velocity of the water in the waterway *O*, and the inventor has curved the buckets forward in the shape shown, so as to better take the water and prevent any flapping against the backs of the buckets.

D, is the arched dome for supporting the shaft *S*; *T*, is the wood toe or step upon which the wheel revolves; *L*, are the legs which support the case; *C*, the couplings which connect the wheel shaft to the shafting of the mill; *M*, is a plate which extends around the case, and serves to confine the water into a solid column when the gate is but partly drawn, as shown on the left in figure 3. This, it is claimed, enables the wheel to give good results at one-half or any fractional part of the gate.

The advantages claimed by the builders of the "Perfection" wheel are these: With the same wheel efficiency is the same, whether the water is taken through many chutes or openings or through only one opening, and the inventor claims that by adopting the one opening he obtains,

1st. A high percentage of useful effect, both at full and at part gate.

2d. Great simplicity of construction, which is of the greatest importance in a machine that is put down in the water and subjected to its corrosive action. There are no small parts such as cog gear, cams, rollers, light rods and levers, which soon rust and wear out and cause a great deal of delay and trouble.

3d. A perfectly water-tight gate, which will always remain so, no matter how long in use.

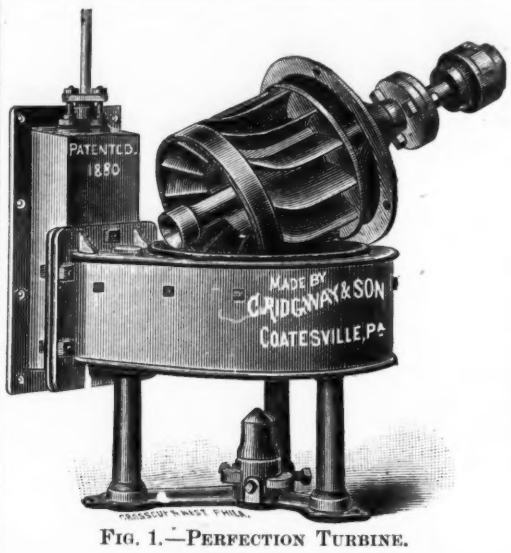


FIG. 1.—PERFECTION TURBINE.

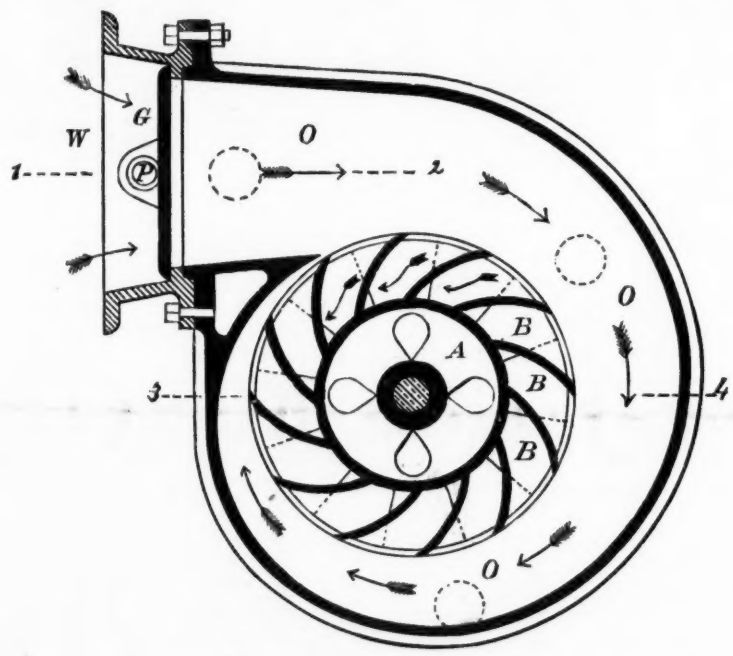


FIG. 2.—HORIZONTAL SECTION.

4th. Freedom from clogging with rubbish. Having but one large opening, instead of a dozen or more small ones, it is claimed that it is impossible for that opening to clog up.

5th. The doing away with penstocks and requiring no expensive iron outer casing into which to set the wheels, thereby rendering the wheel easy to set and attach to machinery, and always having it where it can be seen and looked after, like any other machine in the mill.

The Central Illinois and Wisconsin Railroad Company has been incorporated to build a railroad from Rockton, Ill., to the city of Rockford, thence to the point of intersection with the Chicago and Pacific division of the St. Paul road at or near Davis Junction, thence in a southeasterly direction to the city of Kankakee.

The line passes through a coal mining property of 1,200 acres near Braidwood. The road will be 120 miles long, and will intersect several other roads.

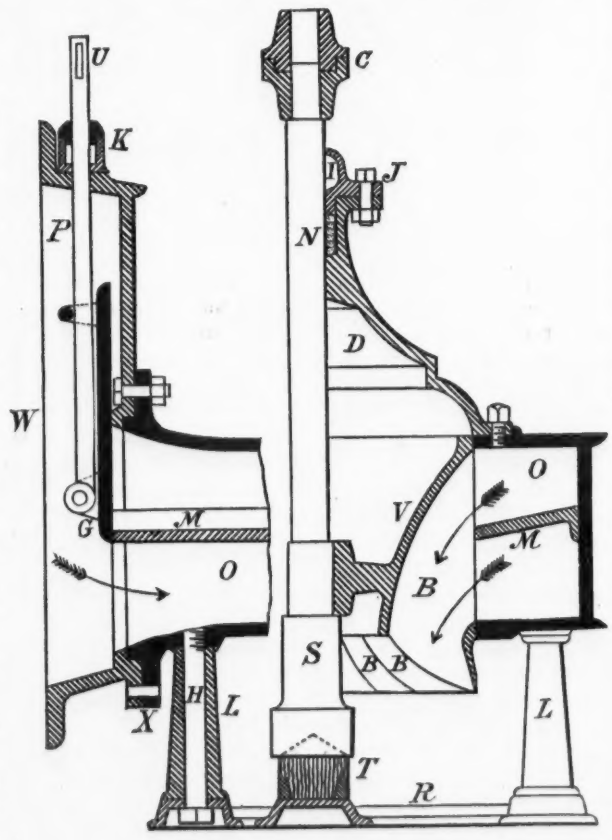


FIG. 3.—VERTICAL SECTION.

Making Cheap Skates.

Cheap but fairly good skates are made in England, in successful competition with German skates, by abandoning the old plan of taking a plank of wood, carefully marking the pattern of the skate required upon it, and then sawing it out. The work is now done well and expeditiously by what might be termed self-acting turning lathes. The skates are shaped in pairs, they are sawn asunder by a circular saw, and then, by means of other machinery, holes for the straps are put in and other neeessary operations performed, and they are then ready for being polished and finished off. A good screw adds largely to the utility of skates in this grade.

American chemical wood fiber for paper making is being exported to France, where it is used in some of the best mills.

Banana fiber is suggested by Mr. Thomas J. Spear of New Orleans as a promising material for paper-making purposes. It grows with great rapidity, requires no replanting after having been once started on a piece of ground, needs no cultivation, enriches the soil, and is mostly fiber. An acre planted in banana plants will, it is estimated, yield eight or ten tons of fiber.—*Paper World*

European Notes.

BY A RESIDENT AMERICAN.

A residence of eighteen months in England has given the writer many opportunities for observation, but he would wish to have it understood that the opinions he has to advance in these Notes are merely opinions, no doubt frequently incorrect, as superficial or imperfect information often is. Yet, as far as it is possible, he has endeavored to be free from prejudice.

In many things the United States is more advanced than Europe, while in others she might learn with advantage from the older countries. The first thing that strikes an American traveler on arriving on this side of the Atlantic, is the condition of the English and Continental railroads. Here the cars are called carriages; the depots, stations; no freight or freight cars, but goods and goods' vans; no conductors, but guards; no switches, but shunts; no freight or box cars, all goods being carried on platform cars, with two-foot sides, covered in bad weather with tarpaulins. This applies to England, not the Continent, where box or freight cars are the rule. The cord running through all American trains and communicating with the engine-driver, is not to be found here, but exists to some extent on the Continent. Sometimes, however, here in England it is used along the outside of the train, and sometimes inside, along the floor, under the mat, in each compartment, on all passenger carriages here and on the Continent, with the exception, as far as the writer's observation goes of Switzerland, where a sort of composite form is in use. Under the seat of each compartment the cord passes through a ring, and there are printed instructions above directing that in case of trouble, the ring is to be pulled up; thus it is to be inferred a bell is rung in the engine. The objection made here to the American cord system is that, owing to the use of compartment cars and the consequent seclusion of the passengers, the cord would be pulled for a *lark*, and it would be impossible to detect the culprit. Any one who has had the misfortune to travel on a crowded train on a bank, or other general holiday, could easily understand what might be done. What could some two or three 'guards" do in a train of ten carriages of three compartments each? Electrical, pneumatic, and telephone systems of communication have been invented, tried, and abandoned, and the problem is yet unsolved. Murders have been committed; and only quite recently, in this great city of London, a man was drugged, beaten, and robbed while in the train. A lady friend of the writer was obliged to get out at a station, and complain of the insulting attentions of a so-called gentleman. It appears that the two systems—the open car and the overhead cord—go hand-in-hand, for it is the publicity that gives it safety.

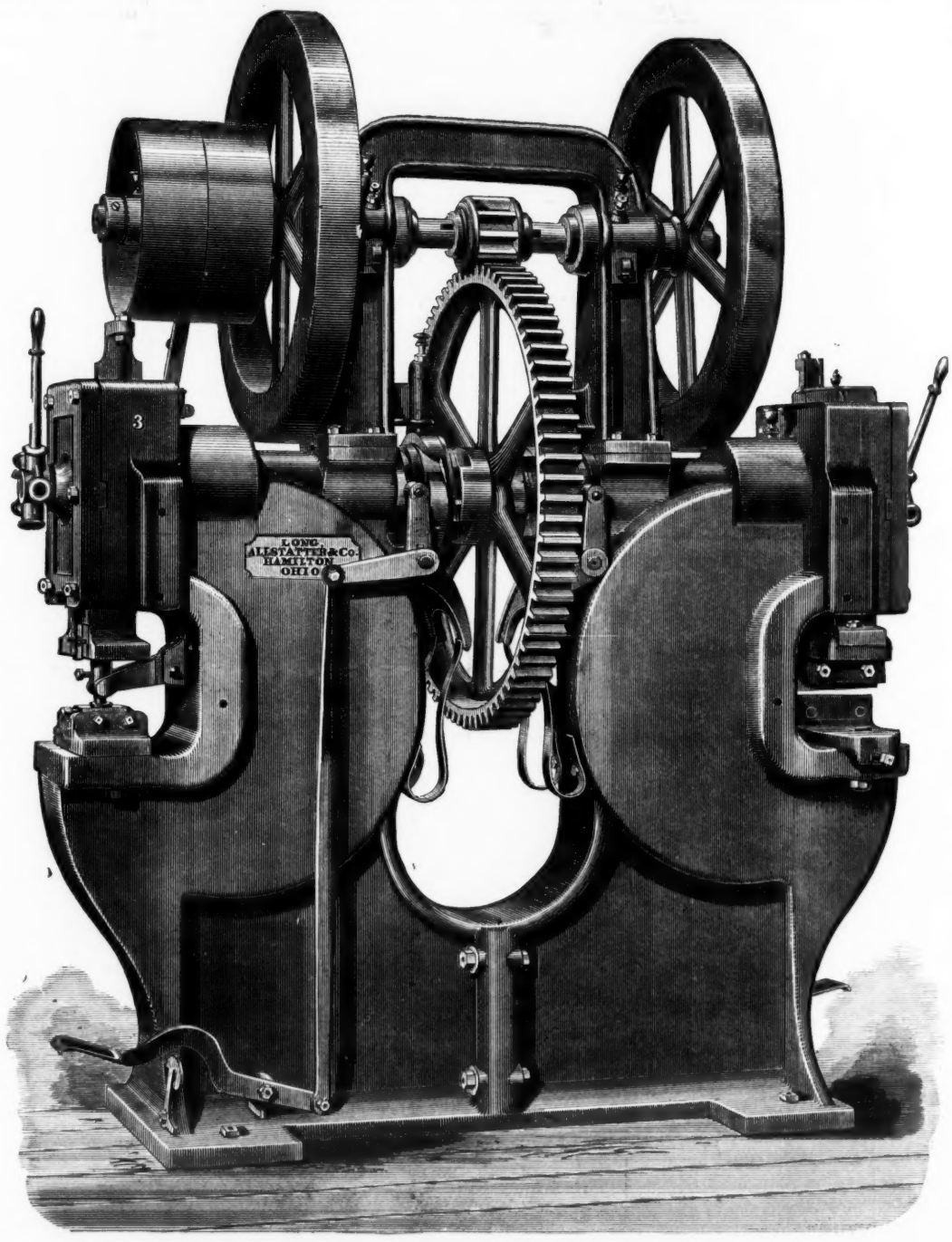
Now, in some things England appears to be more conservative than the Continent. Here the caboose on the engines is open, as a rule, to the weather: across the Channel, as a rule, it is housed in. Here, as a rule, the engines have inside cylinders; there they have both kinds. They do not use anywhere in Europe the head-lights so common at home, but instead, a poor affair of a lantern on each side, with not one-quarter the penetrative power. Another evidence of conservatism is that, when they have successfully proved the value of an invention, they do not generally adopt it for, perhaps, another generation. Continuous brakes have been used here for some time on a few trains, but the great majority have nothing more than the old hand brakes. Trains run every five minutes on the underground railroad in this city; some have continuous brakes, while the majority have not—if it is a good thing, why not adopt it? The Westinghouse Automatic is making some headway, and there is some talk of passing a law compelling all trains to be so equipped. There are two disagreeable concomitants of railroad travel here. One is the violent slamming of the door in your face at each

station as the train starts, and the other is the squeaky screeching of the brakes and wheels when coming to a stop. This is a greater nuisance than might be thought possible, and detracts much from the pleasure of traveling. As no attempt is made at ornament, the engines are black, unsightly affairs. How can any one take a pride in a thing he cannot make handsome, no matter how much he may rub or polish!

Injectors are in use everywhere, but they generally co-exist with a pump. Here all engine whistles are small, and the note consequently sharp and unpleasant. They are less so in France. In no place are they of the deep tone we have at home. No baggage-checking system exists anywhere in Europe. They will label your trunk, and at the destination you must claim it, if, perhaps, some one else has not already done so before you—something that is quite possible. Travelers cannot understand why this system of checking is not introduced here, but they forget that there is not the same necessity for it. Generally, you are not detained more than ten minutes in pointing out your baggage to the railroad porter, and calling a cab, reaching your destination, if within two miles, quickly and at the uniform rate of one shilling (25 cents), and 4 cents extra for each outside piece or trunk. Nor are travelers sometimes just in stating that there is no package express here. Not only does the Parcels Delivery Company meet the case, but their rates are at least fifty per cent. less than at home. A trunk can be sent five miles in London for 25 cents. Now, the system of shunting or switching in use here, and but to a limited extent on the Continent, is far in advance of the cheap live substitute we have in the States. The Saxby-Farmer block system is now known all over the world. Certainly, a plan by which one man can work the switches and signals day and night for 50 or more switches, is certainly worthy of general adoption. As a rule, the trains run at a fair speed—perhaps a little faster than with us, and they ought to, when we consider the small extent of trunk lines and the consequent character and cost of the permanent way; but from the writer's observation, while they generally start on time, they seldom arrive on time, but are very often late.

There are a few Pullman cars in use, particularly on the through lines running north to Scotland, and on a few lines on the Continent; but they will never meet with the general adoption they have in America. There, they were a necessity; here they are not. There, the seats in the ordinary car are not adapted to night travel, as there is no support for the head; while all trains here have backs padded above the head, and, with the exception of the second class carriages in France and Belgium, are quite comfortable; and as the compartments are not generally crowded, it is quite possible to pass the night without discomfort.

A word in regard to steamboats, and we will drop the subject. In the first place, the writer has never seen, except on the Rhine, the pilot protected from the weather; and there the protection is merely an awning. Generally, the pilot wheel is on the bridge, between the paddle wheels; beside the wheelsman the captain takes his stand, and either passes his orders by a boy to the engine room, or he speaks to the engineer through a tube. On the Seine at Paris, the captain from the bridge gives his orders to the wheelsman, at the wheel aft. The same is true of many of the channel steamers; three men doing the work of one—the captain, the boy, and the steersman. On the Rhine, the steering wheel is horizontal, large, and amidships; while on the Swiss lakes it is near the bow and wheel, as with us. Generally, river steamers have paddles worked by oscillating engines, are fast and generally most uncomfortable. The London river steamboats have no protection whatever from the weather, except in the hold below, where no one will go. If it rains put up your umbrella. You always have to carry one here, and why not use it? There are no river steamboats that approach the American either in comfort or speed, with some two or three exceptions. The Dublin mail and some of the channel tug boats—for these passenger boats are certainly no better than tug boats in the entire absence of comfortable accommodations. The Rhine and some of the lake steamers, as well as some new ones on the Scotch rivers after the American style, are great improvements over what is ordinarily seen, they having saloons on main deck with a promenade and hurricane deck above. With these few notes I will leave the subject for the present, hoping at an early date to give the readers of the AMERICAN MACHINIST the results of a visit made to the Continental Exhibitions of Dusseldorf, Manheim and Brussels, with brief notices of the mechanical exhibits.



LARGE PUNCHING AND SHEARING MACHINE.

A recent visit to one of the largest and most important machine shops of New England, showed a man going around hanging newly washed and ironed cotton shades to the windows. In reply to an inquiry, the manager said: "Yes, the curtains had become fairly dingy. We have been so hurried that they have been neglected, and have not been washed for more than a month." There are nice housewives who think two washings a year are sufficient, although it must be confessed that few dwellings can accumulate dirt as fast as a machine shop. —*American Art Journal.*

Punching and Shearing Machine.

This cut represents a Power Punching and Shearing Machine, manufactured by the Long & Allstatter Co., Hamilton, Ohio. It is what is called a double machine, but each side is entirely independent in operation, and controlled by separate foot treadles. The clutch is so arranged that the movements of the slides are always in opposite directions. When one is on the downward stroke the other is on the upward movement. Stopping and starting one side does not interfere with the continuous motion of the other.

They are in this way fully equal to two single machines, occupying about the same space as one, and being run by a single belt.

One side of this machine is shown with the shearing blocks and blades attached, the other being arranged for punching, but this arrangement is not arbitrary.

The tools being interchangeable, can be reversed, or both sides used for punching or shearing by having additional sets of tools. This is of great convenience when it is not desirable to keep them for one purpose only. The shears shown are "crop-cut," but splitting shears are attached in the same way.

The pull off, or stripper, shown on the punching side is made of a single piece of wrought iron, and passes entirely through the body of the machine, and is pivoted at the throat. It is adjusted high or low, for thick or thin iron, by placing a pin in different holes at the rear end. It is removed entirely from the machine by withdrawing the pivoted pin at the throat. It is then out of the way of shearing or other tools.

The cam shafts have large and long bearings in the body of the press, and also in the face-plate, thus giving a support on both sides of the cam, which prevents bending or breaking of the shaft and increases the capacity of the machine. The end of the shaft projects through the face plate, and is mounted with a hand wheel for revolving it by hand in setting the tools. The face-plate is firmly locked and bolted to the jaws of the press. The cams work in steel pintels with steel bearings to take up wear.

The slides have long bearing surfaces with abundant strength to resist the side pressure in shearing and other work, and are adjusted for wearing by tapering gibs, extending their entire length, and held in place by set nuts at the top. The lower ends of the slides are provided with heavy flanges for convenience in attaching shear and punch blocks.

The sockets and punches which fit the slides have square shanks, and are held by a cap which is bolted to the slide, so that they can be removed for sharpening and returned without changing the position of the die. They can also be adjusted up or down, to compensate for wear or grinding, by a simple and convenient device, without altering the position of the slide, the adjustment of the latter being frequently in the way of the work; and when a set of punches or more than one is used at a time, a separate adjustment is necessary.

The small punches and dies are held in the socket and die-holder, which reduces their cost by using only the least amount of steel required to make them.

The automatic stop attachment—furnished when desired—is adapted to boiler, plow, and kindred work. It can be set to stop the punch at any height from the metal, is simple in construction, and is claimed to be sure in its operation, and may be used or not, as desired.

All parts of the machines are arranged with reference to convenience in attaching the tools, such as gauges, pull offs, break-irons, punches, dies, sockets, blocks, bending tools, feed tables, and other attachments as required.

Nearly all the men who have recently been suspended from work at the Reading and Philadelphia railroad shops, in Reading, Pa., are at work again, and it is expected all will be employed by the company within a week or two.

The Ulster & Delaware railroad is being surveyed into the heart of the Catskill Mountains. The route is from Phœnicia to Hunter, with a branch to Tannersville, Haines' Falls, the Laurel House, the Sunset Rock House (a large new hotel now building), and to a point one mile from the Catskill Mountain House. The road is expected to be ready for operation by the first of next June.

The *St. Paul Pioneer-Press* says: "The Canadian corruption cry has already been raised in connection with the Canada Pacific scheme. There are, doubtless, grounds for it already, but the trouble has hardly begun. When the $20,000,000 and the 20,000,000 acres of land are within reach of the jobbers and grabbers, there will be a general scramble for the spoils, and confusion worse confounded will reign in Canada. The most gigantic frauds will follow like misfortunes."

The Steamer Seawanhaka's Boiler.

The operation of cutting up the boiler of the Seawanhaka for old iron has exposed the end of the broken flue very clearly, and one of our staff recently visited the wreck and made a sketch of it, which we present herewith.

A curious feature of the fracture *A* is, that it presents more the appearance of a broken drain pipe than a piece of iron, being short in the edges and as square across as a broken window glass. The force that ruptured it must have been sudden and violent, for the rivets still remain in the flange of the smoke box *E*, with a portion of the flue attached. In connection with the collapsed tube *C*, found in the tube sheet, and removed from the boiler, there is no difficulty in accounting for the destruction of the vessel. The precipitation of a body of water (following the broken flue and tube) upon the fire through obvious channels, caused an instantaneous explosion of steam and gas in the furnaces, which seeking the weakest portion—the doors—blew them open; an outlet being thus afforded a body of flame which ignited the combustible portions. It would be a matter of some interest to the traveling public to know how far steamboat owners have complied with the recommendation of the jury on the Seawanhaka disaster, to sheathe their fire rooms with iron, and also whether there are any more boilers in daily use liable to give out in the same way the Seawanhaka's did.

The smaller engraving shows a fragment easily removed by us from the broken flue, and displays the mark of a boiler-maker's cape chisel, at *A*, which may or may not have been done subsequent to the rupture.

The Executive Committee of the Southern Railroad met recently and agreed upon the purchase of machinery for the Chattanooga shops, to cost about $4,000. A meeting of the Trustees was held, and the action of the Executive Board approved.

Newly-Incorporated New York Companies.

Electro-Graphic Manufacturing Company, New York. Capital, $1,000,000, in shares of $10 each. For the manufacture and sale of electro-graphic appliances and inventions, and all other kinds of electrical apparatus. Oct. 21st, 1880.

Manhattan Water-Meter Company, New York. Capital, $200,000, in shares of $100 each. For the manufacture and sale of water meters and other machinery. Oct. 21st, 1880.

The United States Tube Rolling Stock Company, New York. Capital, $500,000, in shares of $100 each. For the manufacture and sale of railway cars built of iron tubes, under patents granted to the La Mothe Manufacturing Company. Filed, Oct. 21st, 1880.

La Gallia Manufacturing Company in America, Utica. Capital, $400,000, in shares of $100 each. For the manufacture and sale of "*Biere de lait*," under Kokosinsks' patents. Oct. 22d, 1880.

The Rochester Grape Sugar Company, Rochester. Capital, $1,000,000; in shares of $100 each. For the manufacture and sale of grape sugar. Oct. 22d.

The Rawson Manufacturing Company, Hornellsville, N. Y. Capital, $150,000, in shares of $100. For the manufacture of the Rawson mower and reaper, and other agricultural implements. Oct. 25th, 1880.

American Patent Bolt and Lock Nut Manufacturing Company, New York. Capital, $300,000, in shares of $50 each. To manufacture and vend bolts and nuts, and other articles of either iron, steel, or brass. Oct. 26th.

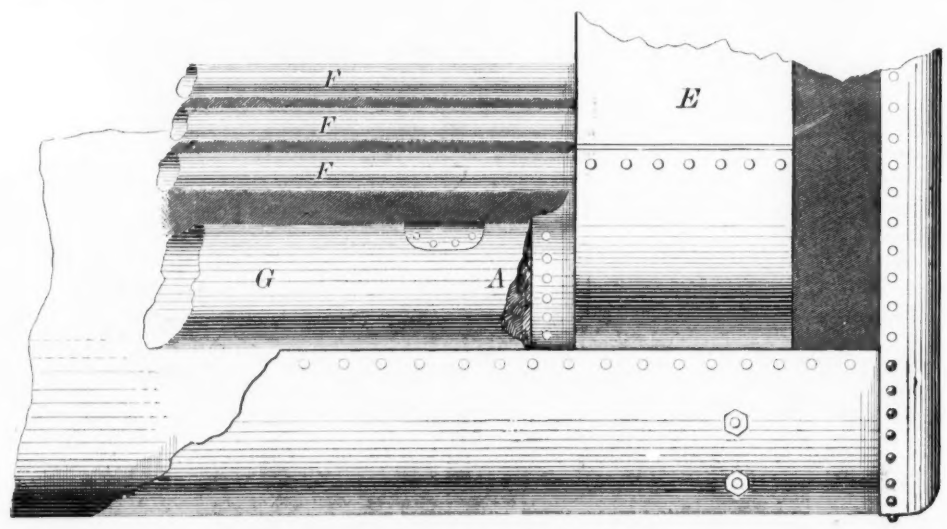
Delany Patent Telegraph Relay Company, New York. Capital, $100,000, in shares of $100 each. For the manufacture and sale of telegraphic apparatus, and Delany's Patent Telegraphic Relays. Oct. 26th, 1880.

The Holler Patent Chronometer Company, Brooklyn, N. Y. Capital, $20,000, in shares of $50 each. For the manufacture and sale of clocks, watches, and the like, under patents issued to Peter Holler. Oct. 26th, 1880.

Nautical Transportation Company, New York. Capital, $100,000, in shares of $100 each. For the purpose of constructing, owning, and using vessels and machines, to

be employed for hire in towing vessels, carrying freight and passengers, and in aiding, protecting and saving vessels and their cargoes, wrecked or in distress. Oct. 27th, 1880.

The Ivers & Pond Piano Company, of Boston, has been incorporated, with James N. Thompson, Pres., and Geo. A. Gibson, Treas. Capital, $10,000, in shares of $100 each. For manufacturing pianofortes.



DISMANTLED BOILER OF THE SEAWANHAKA.

Look to Your Indicators.

In a recent comparative test for economy in a new compound-engine, four indicators by various makers were employed and assumed to be correct; but upon testing them by a steam gauge, known to be so, it was found that three of the instruments were out of truth, one of them five pounds. This shows that it will not do to assume that instruments are in good order, for aside from a faculty for correct observation, the first thing is to have good tools. Draw atmospheric lines, and lines of whatever pressure it is intended to work to, and then lay out the scale by a rule, and test the indicator before taking cards.

Blast Furnace Statistics.

The Iron Trade Circular (*Ryland's*), of Birmingham, England, gives the following statistics of the blast furnaces of Great Britain:

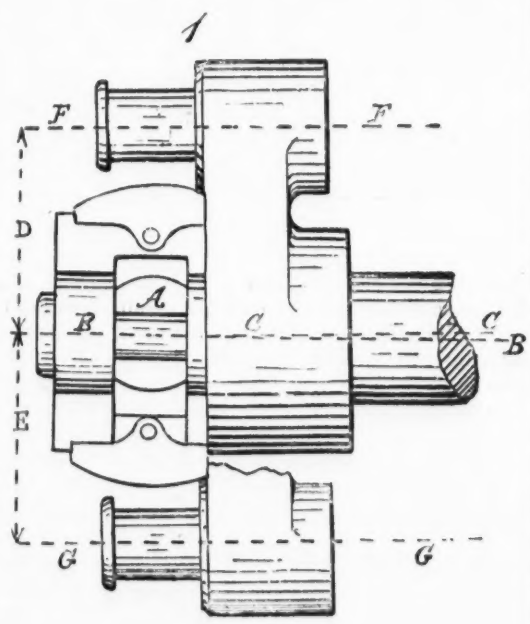
Total number of furnaces built in the United Kingdom, Sept. 30, 1880	955
Total number of furnaces in blast in the United Kingdom, Sept. 30, 1880	554
Decrease in the number of furnaces in blast since last return, June 30, 1880	5
Furnaces blown out since last return, June 30, 1880	42
Furnaces blown in since last return, June 30, 1880	37
New Furnaces built since last return, June 30, 1880	3
Furnaces built but not in list before	6
Furnaces pulled down since last return, June 30, 1880	1
New furnaces being built at the present time	3

The condition of the blast furnaces of the United States, October 1st of the present year, is given in the *Iron Age* as follows:

	In blast.	*Out of blast.*
Charcoal	153	116
Anthracite	143	96
Bituminous	128	91
Total	424	303

The number of anthracite furnaces has decreased from 167 to 143, while the charcoal furnaces have increased from 131 to 153, and the bituminous from 115 to 128.

It is nearly time for some one to come forward with another flying machine, warranted to go to Europe in three days, more or less. All the cigar-shaped balloons, propelled by wings and tails of various kinds, having failed to answer expectation, it is necessary to explore some other field for devices that will carry weight and stand the strain of propulsion. A recent number of the *English Mechanic* has an illustration of an apparatus which, although it does not fulfill these requirements, is novel, and is here described briefly: A structure, made of cotton cloth and thin plank, about eighty feet long and sixteen inches wide, was arranged something like an old-fashioned Venetian blind, the vanes or slats being horizontal. A place was made in the center for the reception of a man's body, and a pair of wings provided to be worked by said man. The result of a trial trip is as follows: It was taken out on a windy evening, when it proved quite unmanageable; turned over on one side, and destroyed itself. It does not appear that the inventor used the wings, having no time to flap before the catastrophe was over.



When man can bring back "the sound of a voice that is still" with a machine, as in the case of the phonograph, it is hazardous to say he never will fly, but the apparatus just described seems to decide some points.

Setting Engines in Line.

BY JOSHUA ROSE, M. E.

No. III.

TO TEST THE PARALLELISM OF THE CRANK SHAFT WITH THE CROSS-HEAD JOURNAL.

It is now to be explained how to test if the axial line of the crank shaft is at a right angle to that of the cross-head journal, when viewed from the crank-shaft end and horizontally.

From a want of parallelism in this direction, heating of the crank pin and cross-head journals is *sure*, and a pound or thump is, to some extent, liable to occur, and the cause, if the error is slight, is difficult to discover, save by using the connecting rod to test with.

When a pound occurs at the end of the stroke (when the crank is on a dead center), it may arise from a ridge at the cylinder, or at the guide-bar end, or from the connecting-rod brasses being insufficiently keyed up; but when it occurs while the crank is at half stroke these causes are eliminated, and the cause must be looked for in either a crank pin not parallel to the crank shaft, or, as in the case now under consideration, from one or the other crank-shaft journals being too low.

Assuming the crank pin and crank shaft to be axially true, one with the other, we may proceed to show separately the cause of the heating and that of the pounding, if the crank journal is too low at either end.

In Fig. 1, let *A*, represent the cross-head journal, and *B*, *B*, a line parallel to it. Let *C*, *C*, represent the axial line of the crank shaft (being out of parallel, from the crank end being too high or the other end too low). Let *F*, *F*, represent the center line of the crank pin when at the top, and *G*, *G*, when at the bottom of its path of rotation, and it will be observed that the vertical distance between the crank pin and the axial line of the cross-head journal is less on one side than on the other, thus in the figure distance *D* is less than *E*. We have in this case, measured these distances on a plane at a right angle to the cross-head journal, but it will make no difference if we measure them on a plane with the path of rotation of the crank pin, as will be seen in Fig. 2, in which the distance from the center of the crank pin at two opposite points in its path, is represented by dots shown at *E*, *F*, and from *E*, to *H*, measures less than from *F*, to *H*, which represents the center of the cross-head journal.

In Fig. 2, let *A*, represent the axial line of the cross-head journal, *B*, a vertical line at a right angle to *A*; *C*, representing the crank shaft extended by a dotted line, so as to enable comparison with *A*; *D*, the crank, *E*, and *F*, the center of the crank-pin journal, and *G*, *G*, a line at a right angle to cross-head journal *A*.

Now *G* being at a right angle to *A*, represents what should be the plane of rotation of the crank pin, whereas *C*, being out of parallel with *A*, causes the path of rotation to be in the path from *E* to *F*, or as *D* compared to *B*; supposing then that the bores of the connecting rod brasses to be axially parallel, one to the other, and keyed so as to properly fit the journals, and one bore of those brasses will stand parallel to *E* while the other is parallel to *A*, or when at the bottom of the crank rotation, one bore will be parallel to *F* and the other parallel to *A*. Thus the rod will be twisted, and the strain due to this twist will cause the bearings to heat. That this twisting is continuous throughout the whole revolution may be seen by the want of parallelism of the dotted line (representing the crank pin when on the dead center) with *A* (representing the cross-head journal).

It is now to be observed that if the plane of the crank rotation were at a right angle to the axis of the cross head, as it should be, the path of the center of the crank-pin journal, would be in the plane of *GG*, whereas it falls outside as at *E*, and inside as at *F*, while at *H*, it is coincident; hence it appears

that starting from a dead center *H*, the rod bends, passing at that end outward to *E* (when the crank has made a quarter revolution), where it attains its maximum bend, thence diminishing until finally ceasing, when the crank reaches the other dead center. As soon, however, as it passes the last dead center a bend in the opposite direction takes place, attaining its maximum at *F*, and ceasing at *H*. This bending also causes undue friction and the consequent beating of the journals; furthermore, if there be any *end* play between the brasses and the journals, there will be a pound, as the brasses jump from one end of the journal to the other at different parts of the stroke. It is obvious that if the crank end of the crank shaft was too high instead of too low, as in our example, then the effects would be the same, but *E* would fall on the inside instead of the outside of *G*, while *F* would fall outside instead of inside.

To discover if the crank shaft is out of parallel in the direction here referred to, connect the connecting rod to the cross-head journal, setting the brasses up to a close working fit. At the other end of the connecting rod put the strap keys and brasses in their places, but not on the crank-pin journal. Place the crank in its highest position, and lower the end of the rod down to the crank-pin journal, as shown in Fig. 3, and if the crank shaft is parallel (in the respect here referred to) to the cross-head journal, the brass flanges will just meet the radial faces of the crank-pin journal, as shown in Fig. 4. If, however, the crank end of the crank shaft is too low, as in our example, the flanges of the brasses will fall to one side of the crank-pin journal, and that side will be toward *B*, Fig. 5, when the crank pin is at the top, and toward *C*, Fig. 6, when it is at the bottom of its path of rotation.

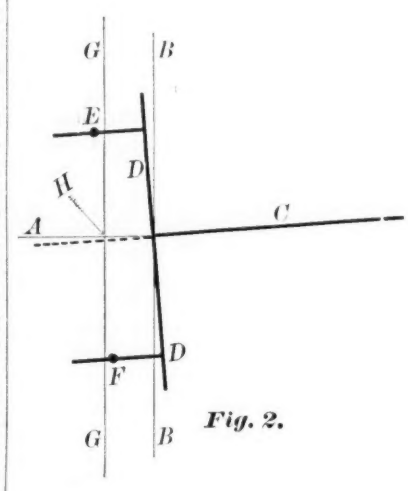


Fig. 2.

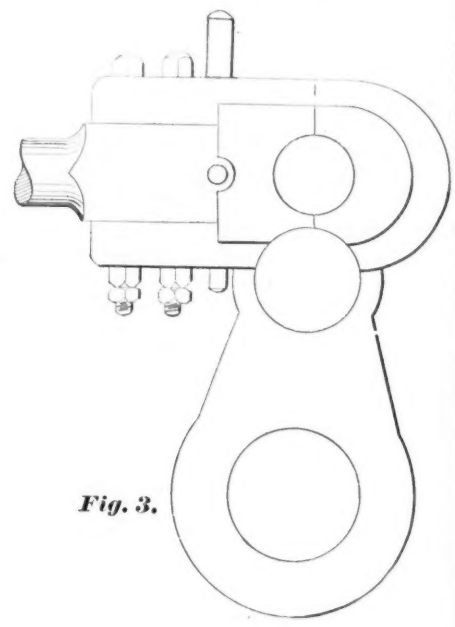


Fig. 3.

The effects will be precisely the same, and in the same direction with relation to the various parts of the crank's revolution, if the crank-pin end of the shaft was of correct height; but the other end was too high, hence, in correcting the error, it is desirable to place the engine on the dead center, so as to determine which end of the shaft to operate on—that is to say, whether to raise the crank pin end or lower the other end. But suppose the error to be that the crank-pin end of shaft was too high instead of too low, then, the testing being continued as before, the effects will be of the same general character, but altered with relation to the specific parts of the revolution. Thus, when the crank is at the bottom, the rod would fall towards *A*, Fig. 7, and when at the top, it would fall in the opposite direction, or towards *D*, Fig. 7.

Celluloid for Printing Plates.

It is well known to practical printers that the ordinary stereotype and electrotype plates in common use are more or less imperfect, and that just complaint is made of their failure to reproduce the finest effects of the engraver and printer.

JANNIN, a French sculptor, was led to make some experiments with celluloid, as a substitute for electrotypes, with perfect success, and the details of his process are thus described in the *American Model Printer*.

From the form it is desired to reproduce, a copy is taken by means of a cement composed of yellow oxide of lead and glycerine; this is spread over the form, care being taken to avoid air bubbles, to the thickness of about $\frac{3}{16}$ths of an inch. On metal plates this cement can be applied warm, and requires only two or three minutes to set hard enough to be removed, but as it must be applied cold to wood-cuts, it requires fifteen minutes to harden. It is then easily stripped off the mould, or form, and put on the platen of a hydraulic press, face upward. A sheet of celluloid, about $\frac{3}{16}$ths of an inch thick, is then applied to the cement matrix and forced into it by hydraulic pressure, aided by heat; this is kept up about five or six minutes when a stream of water is thrown on the celluloid plate to harden and cool it, and it is then removed and ready for use at once. This process is so very simple in detail, avoiding the use of black lead in any form, requiring no melted metal, and withal so expeditious, that it would seem as though it would speedily come into general use. The outlay for a hydraulic press is a considerable expense, but one more than counter-balanced by the increased amount of work obtained.

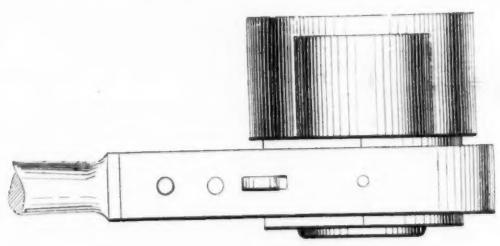


Fig. 4.

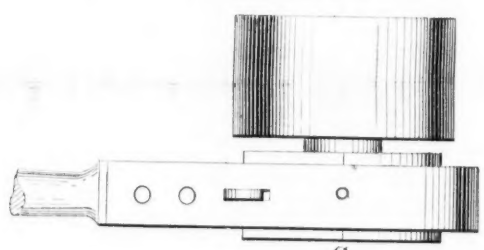


Fig. 6.

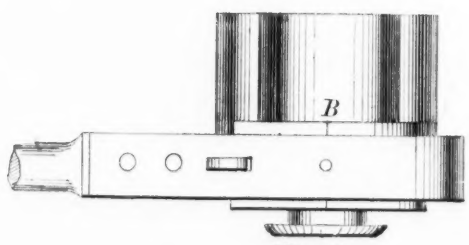


Fig. 5.

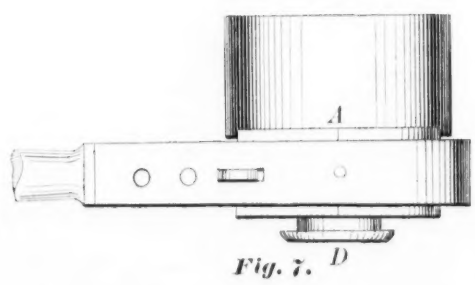


Fig. 7. D

A New Departure at the Oneida Community.

The Syracuse *Evening Herald* says: Nine members of the former Oneida Community, namely, Albert Kinsley, Henry W. Burnham, George Campbell, Charles S. Joslyn, Wm. A. Hinds, Martin E. Kinsley, Myron H. Kinsley, Theodore R. Noyes and Francis Wayland Smith, of Lenox, Madison county, have filed articles of association to be known as the Oneida Community, limited. They propose to manufacture and sell traps for catching game, machinery and machinists' tools, grey iron, malleable and brass castings, chains of various sizes and kinds, and articles of general hardware; to manufacture, color and sell threads, cords and cambrics from silk and other materials; to pack, dry and sell fruits, jellies, vegetables, cereals and meats; to manufacture and sell wine, cider and vinegar; syrup and sugar from corn, sorghum, beets and other substances, and table, hollow, flat and ornamental ware. Also to conduct the general business of farming, including the breeding and sale of blooded stock. Also the business of printing, publishing and book-binding, the keeping of boarding houses, livery stables and catering for excursionists; the keeping of a general store; the manufacture and sale of boots and shoes, clothing and tinware, and to carry on the business of dentistry, wood-working and blacksmithing. The principal localities of these various branches of business are to be at or near the present community in the towns of Lenox and Vernon, in the counties of Madison and Oneida, at Niagara Falls, and at Wallingford, in Connecticut. The capital is placed at $600,000, divided in 24,000 shares of $25 each. The results of the new departure will be watched with interest by the people of Central New York. The community, as originally constituted, was a remarkable success considered merely from the business point of view, but whether that success will continue now that it has abandoned most of its distinguishing features remains to be seen.

The *English Mechanic* gives this formula for frosting brass work to give it an ornamental finish:

"Boil in caustic potash, rinse in clean water, and dip in nitric acid till all oxide is removed: then wash quickly, dry in box-wood sawdust, and lacquer while warm."

Detroit Lubricator Cup.

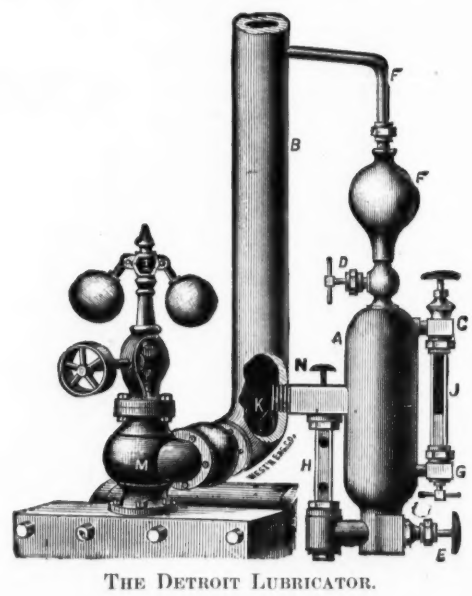
In the course of many experiments in trying to introduce a continuous lubrication within the steam chests and cylinders of steam engines, a number of useful devices have been originated which possess a more or less degree of merit.

These ideas have likewise been improved in the endeavor to secure something superior to the rest. The engraving shown herewith represents a cup which possesses some of the meritorious improvements. *A*, is the reservoir for oil; *B*, the steam-pipe to the engine; *C*, the oil filler; *D*, the water feed valve; *E*, valve to regulate the flow of oil; *FF*, is a steam tube and condensing chamber; *G*, a valve to draw off water to prevent freezing, etc.; *H*, a visible feed water chamber; *J*, glass indicator; *K*, oil discharge pipe; *M*, governor valve, and *N*, the check valve. The object of this cup is to introduce the oil drop by drop into the column of steam where it is vaporized, thus becoming a steam lubricant, which is carried to every part of the valves and cylinder, lubricating all alike. In applying lubricants to cylinders in the ordinary way, it is well known that the valves first receive a drenching, then the cylinder, then the oil is carried off by the first admission of steam, thus the oil is wasted, and in a remarkably short time the parts suffer for want of proper lubrication.

The operation of this cup is as following, viz.: The cup being attached to the steam pipe above the governor valve, steam passing down the pipe *F* into the condensing chamber *F*. The valve *D*, being opened, and the reservoir *A* filled with oil, the weight of water above the oil in the reservoir will cause the oil to be forced out at the bottom, the flow of which is regulated by the valve *E*.

The oil passes into a glass tube *H*, filled with water, where the drops of oil may be seen issuing from the end of the tube, and rising through the water in the glass, passes through the oil discharge pipe *K*, and thence into the cylinder, the governor valve *M*, deriving its proportion of benefit from lubrication. By the general arrangement of these appliances the oil is kept warm, and the engineer can see at once how fast oil is being used, and regulate the supply accordingly. By supplying the oil to the engine continuously and in small quantities, a great saving in the lubricant is effected, as well as materially reducing the wear of the different parts.

The indicator glass *J*, shows at a glance the amount of oil in the reservoir. This cup is simple in construction, the body *A*, being cast in one piece, is not liable to leak or get out of order, and any kind of oil or tallow may be fed through it. It may readily be cleaned by blowing steam through it without disconnecting from or stopping the engine. These lubricators are furnished and applied by James Beggs & Co., 8 Dey street, New York.



THE DETROIT LUBRICATOR.

Five steamers have been ordered to be built on the Clyde for the new French Company, to trade with the United States.

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☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

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NEW YORK, NOVEMBER 13, 1880.

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Prospects of a Busy Winter.

What with non-sinkable, incombustible, iron excursion boats, locomotives to run ninety miles an hour, and various other startling mechanical novelties the inventors do not permit us to specify at present, the traveling public will have a lively time of it next summer, and the venerable tubs now doing business by running each other down in broad daylight, or sinking others peaceably going about their business, will have to go into towing canal boats to make a profit for their owners.

If numerous plans avail aught, there should be a perfect armada of iron excursion boats afloat next year, for within the past week we have seen projections of three, one of which is to run not less than thirty miles an hour, and perhaps a great deal more!

In all these promising schemes there is good in one aspect, and that is the prospect of a busy winter for machinists and boilermakers; so we trust that the contracts will be given out with as little delay as possible. Beside the activity in our own particular field, other handicraftsmen will come in for their share. Painters, joiners, decorators, upholsterers and all that goes to the building of a ship will take a hand in. Christmas stockings ought to get fat this year unless all signs fail.

Common Defects in Steam Boilers.

We notice that a great many boiler makers appear to be carried away with the idea that it is only necessary to provide large grate and fire surfaces in a given space to secure an economical boiler; that given a great many tubes, or flues, or fire-conducting surfaces, of whatever kind, there must of necessity be effective and rapid evaporation. This is not so. The disposition and location of the fire surfaces have as much to do with the efficiency of the boiler as the area of them. So with reference to the circulation of the water. If the fire furnishes heat that the water does not convey away from the tubes or plates, they are being rapidly destroyed on the fire side. A boiler ought to be as hot in one part as another to secure durability and safety, for no force is more irresistible than the expansion and contraction of iron; and it ought to be a danger signal to every engineer, when he finds that one part of his boiler is comparatively cold and another unapproachable from heat. The strain of the working pressure is enough to guard against, without unnatural strains arising from mal-construction. If the arrangement of the boiler is good in the foregoing respects, it ought also to be easily accessible for cleaning and examination of all parts of its interior to note its condition. Most boilers give good results when new, when all the surfaces are clean and free from ashes or soot, or the inside without scale; but three months' service shows a vast falling off in their working, and when it is attempted to clean them, it is found impossible to reach the important parts without taking them to pieces.

Ample water spaces should also be provided, for a defect in this particular is a vital one. A steam chimney or drum, as large as the dome of St. Peter's church, is of no value without solid water from which to generate steam, and this is very noticeable when an attempt to force any boiler is made. Many boilers are burned with gauges full of water from this cause, for very hot plates repel the water even when it might show full in a state of rest.

It is not always possible to obtain all of these qualities in one steam boiler, but that they combine very essential and vital points we think all practical men will concede.

More Big Steamships.

Despite the failure of the Great Eastern steamship to realize the expectations formed for her, and the assertion that vessels of her size were unprofitable, modern steamships now building approximate very closely to her dimensions, and almost equal her in carrying capacity.

Ships of 450 feet in length are common, but the Cunard line are now building the *Servia* 500 feet long, and the Inman line, the *City of Rome*, 546 feet long, with 10,000 and 8,000 H. P. respectively. These are screw steamers wholly, and are expected to cross the Atlantic in six days and a half,

Location of the World's Fair.

The committee seem to have some difficulty in deciding upon a site for the coming World's Fair of 1883. It is obvious that many considerations enter into the calculation, and probably when a site is found that is best under all aspects, loud objections will be made to it on all sides by parties who have no interest in the matter whatever. Port Morris, about one mile from Harlem, in the north part of the City, has been suggested and visited, as it has ample water front, City sewerage, ease of access, light, and other necessary adjuncts. The Commission visited it on Tuesday for inspection, but have reached no conclusion as yet. We shall give our readers the fullest information respecting the site, buildings, etc., when it is made public.

First Annual Meeting of Mechanical Engineers.

In our last issue we stated, on the authority of the chairman of the Committee on Securing Rooms, that the approaching annual meeting of the American Society of Mechanical Engineers would be held in room 24 of the Cooper Union, the rooms kindly proffered by the Society of Civil Engineers having been thought too small for the purpose. We are pleased to note that the prospects of a large meeting are so favorable as to compel the selection of a still larger room, as will be seen from the following circular:

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, TREASURER'S OFFICE,
96 FULTON ST., N. Y., Oct. 27, 1880.

Dear Sir:—In consequence of the growing indications of a large attendance at the approaching annual meeting, it has been thought best to secure greater facilities than are afforded by either of the places heretofore contemplated or announced. The committee have, therefore, hired the Union League Theatre, 26th street, between Madison and Fourth Avenues, New York City, for the purpose of holding the first annual meeting of the society. The auditorium is about 40×45 feet in size; seats 400 people, and is well lighted, warmed and ventilated. The session will begin at 2 P. M., Thursday, November 4, 1880. By order of the president. Yours respectfully,

LYCURGUS B. MOORE,
Treasurer and Acting Secretary.

Publication of New Patents.

Leading engineering journals in England have begun the weekly publication of the specifications, claims, and drawings of new patents as they are issued by the British Patent Office. These reports are presented in the form made familiar to inventors in this country, by the information contained in the *Official Gazette* of the Patent Office. In the United States, any inventor, by the payment of $6 per annum to the Commissioner of Patents, can subscribe to this publication, and in this way obtain an accurate record of all inventions acted upon by the Patent Office. This publication leaves, or should leave, the technical journals free to turn their attention to practical matters of tangible value to mechanics. The British Patent Office will do well to adopt the same comprehensive and satisfactory plan.

The Livadia.

This peculiar vessel, of which public mention has been previously made, has recently been tried on the Clyde with results appended below. Our readers may not recall the dimensions of this vessel, which are 250 feet long, by only 153 feet wide; these figures are correct, and a section of her would resemble that of a lemon, cut lengthwise.

It would seem as though such a model could not be propelled through the water at any reasonable speed; but such is not the case; she made on the measured mile 16 knots, and developed over 12,000 horse power in her engines. By her peculiar build, she is enabled to carry this enormous force, which is also the secret of her speed.

Among the latest mechanical intelligence from England is the following. On the Midland Railway the driver of the Scotch express "heard a knocking" under his engine, which he subsequently discovered came from his connecting rod on the crank end. After he had keyed it up, he pulled out again; but did not discover that meanwhile his engine had been reversed, so he shot backward down a grade of one in 132, and smashed into a freight train half a mile from where he started.

Responsibility for the Engine Test Fizzle.

We publish the following letter, which we have just received, desiring only to preface it with the statement, that, inasmuch as the AMERICAN MACHINIST is intended to represent only the best interests of American mechanical progress, we have freely offered our columns to any proper correction of our remarks that Mr. Hill desires to make over his signature, but thus far he has not availed himself of the proffered courtesy.

We did not attempt to locate the responsibility for the fizzle, merely calling public attention to the fact that the tests were a fizzle.

Editor American Machinist:

In a recent number of your journal I noticed an article on "The Cincinnati Engine Tests," and being an exhibitor and competitor both, I was interested in the article.

I was present during the test of engines, and, while I am disappointed in the result of the exhibition, I believe your article bears heavy in some places where it should not.

I believe the whole responsibility of the fizzle rests with the Board of Commissioners; but the experts and their assistants did all they could to make the test impartial and interesting.

That the corps of assistants should have worn a skull cap and badge, by which they were distinguished, as having official connection with the test, I believe to be eminently proper, and was advantageous to the conduct of the test.

Having been acquainted with Mr. John W. Hill for many years, I know it is foreign to his character to seek to make a display by gaudy uniforms or glittering trappings, and I feel I but do the gentleman justice when I say his high professional position rests not in ostentation, but in his merits as a mechanical engineer.

Very truly yours,
WM. A. HARRIS.
Providence, R. I., Oct. 25, 1880.

We are sorry to observe that some of our industrial exchanges have been so carried away by the political excitement of the campaign just closed, as to devote a portion of their space to reviewing the positions occupied by some of the candidates. Politics, we contend, is a business that does not properly come within the scope of a technical journal.

The American Institute Fair is well attended, and presents quite a variety of attractions to those who have not visited the exhibition in previous years. There is but little that is new in the machinery department, although many of the mechanical exhibits are the very best of their class. The appearance of the main hall is very much like a bazar, and the resemblance is helped materially by the numerous solicitations visitors receive to buy certain novelties, or to "try their luck" in a glass toy lottery for 25 cents. If these huckster shows were cleared out, the fair would be much more valuable.

Has any of our readers heard anything lately about a Cloud Engine Company (capital, $5,000,000), who sent us some communications from their "temporary office," which were published in our issue of Oct. 2d? We have heard nothing from them since publishing those communications.

We are in receipt of a circular from the U. S. Consul at Crefeld, Rhenish Prussia, giving information of arrangements to exhibit, in suitable apartments at the Consulate, such sample articles as American export merchants and manufacturers may desire to bring to the notice and favorable consideration of people on the Continent of Europe.

Bulky machinery can be represented by models, drawings, or descriptions. It is not desirable to send other than such articles as are adapted to the practical uses and wants of the masses of the people and the popular industries of the country.

A reading-room has also been provided where American periodicals and circulars, descriptive of articles on exhibition, will be conveniently arranged for the use of those desiring information concerning American productions.

Those sending articles must deliver them free of charge to J. S. Potter, Consul, who will give his personal attention to answering communications from remote points, and such other service as may be deemed useful in opening avenues of trade and extending the demand for American productions.

Perhaps there has never been greater rivalry or competition among stove founders than at the present time, and the greatest efforts are made to secure customers by an attractive exterior and showy design. Too many patterns offered are overloaded with ornament and nickel plate, while the castings of which the stove is composed are too thin to be durable or stand transportation.

We are pleased to notice the beautiful bird's-eye view of the city of Buffalo, N. Y., just published by the enterprising advertising agent, E. H. Hutchinson, 440 Main St., Buffalo. The picture is lithographed suitable for framing, and presents a very graphic idea of that large manufacturing and commercial city, being entirely original in its character and accurate in detail. Sent by mail, to any address, for three dollars, postpaid.

Henry R. Worthington, the well-known steam pump and pumping engine manufacturer, has just issued a new and revised edition of his book, which bears the following title:

THE WORTHINGTON STEAM PUMPING ENGINE.—History of its invention and development, etc.

The book contains a very interesting account of the difficulties which took place in the early experience of the author as an engineer, describing the incidents which led to his invention of the direct-acting steam pump. The description of experiments with different kinds of valve gear and general arrangement is very instructive, particularly to the practical engineer, who has racked his brains in trying to invent some automatic device which will perhaps work while you watch it, but when left to itself will act in a manner that beggars description. The work is embellished with numerous engravings, also diagrams which were taken during numerous and exhaustive tests of pumping engines. The yearly duty of many of the engines is published in full, and, in short, the book is full of practical information. We expect to publish some extracts from this work in a future issue.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly and according to common sense methods.

(1.) R. R., Irwin Station, Pa., writes: We are about to make a machine to press off car wheels, and propose to use a screw of hammered iron 3¼" diameter, 3½ threads to the inch. The screw will be turned by means of a hand wheel 6 feet in diameter. Four men will be used exerting a force, say, of 300 lbs. at the rim of the wheel. What pressure will the end of screw exert at the point of resistance? and what percentage of friction should be deducted from the theoretical power produced by the leverage given? *A.*—Your communication, as we understand it, resolves itself into the following question, viz.: What power can be exerted by a screw-press, having a screw 3¼ inches in diameter with 3½ threads to the inch, and worked by a hand wheel 6 feet in diameter, to which is applied 300 pounds to turn it. What percentage of the theoretical force of the press should be deducted for friction? The rule for finding the force exerted by a screw, is to "multiply two times periphery (= p = 3.1416) by the radius of the hand-wheel and this product by the force in pounds exerted on the hand-wheel, then divide the result by the pitch of the screw-threads:—The quotient will be the force, or pressure, in pounds exerted at the end of the screw. Putting F, for force in pounds exerted on the hand wheel R, for radius in inches of the hand-wheel: P for pitch in inches of screws $\left(=\frac{1.00}{3.5}=0.2857 \text{ inches}\right)$ P for periphery, and W, for force exerted by the screw. The formula is:

$$W=\frac{2\,p\,R\,F}{P}=\frac{2x3.1416x36.x300}{0.2857}=237.517 \text{ pounds,}$$

which is the theoretical force of the screw. Allowing 25 per cent. loss of force in the machine due to frictional resistances, the effective force of the screw will be (237.517x0.75 =) 178.138 pounds; or, $\left(\frac{178.138.}{2000.}=\right)$ 89. tons.

The pitch of the thread is entirely too fine for service under the pressure required, and will be likely to strip before long.

(2.) J. F., Newark, N. J., writes: I would be pleased if you will answer the following questions: What is the centrifugal force of one pound traveling 250 revolutions per minute within a radius of 5½ inches? Can you give a rule for computing centrifugal force at a given radius and speed?—*A.* The first question, briefly stated, is as follows, viz: A body weighing one pound, revolves in a circle whose radius is 5½ inches, and has a motion of 250 revolutions per minute; what is its centrifugal force? Assuming that the centre of gyration of the body is at a radial distance of 5½ inches from the center of motion, we adopt the following rule for calculating its centrifugal force: "*Multiply the weight in pounds of the revolving body by the square of its velocity in feet per second, and divide the product by 32.2 times the length in feet of the radius of its circle of motion.*" In the example given, the radius is $\left(\frac{5.5}{12.}=\right)$ 0.4583 feet, and the velocity of the body in feet per second is $\left(\frac{0.4583x2.x3.1416x250.}{60.}=\right)$ 12. feet. Then, by the rule, we have the formula:

$$\text{Force}=\left(\frac{\text{weight x velocity square}}{32.2 \text{ times radius.}}=\right)$$

$$\left(\frac{1.x12^2}{32.2x0.4583}=\right) 9.76 \text{ pounds.}$$

The circle of motion, in the rule given, means the circle of motion of the center of gyration of the body. Now, the center of gyration of a revolving body is a point in the body in which, if all the revolving matter was contained, it would have the same energy as the body has. The center of gyration in a bar rotating around one of its ends, is at a distance from that end of 0.5775 times its length: In a cylinder, and in a circle-plane, revolving on their axes, the center of gyration is at a radial distance from their axes of 0.7071 times their respective circumferential radii. In a ring or rim of uniform width, revolving on its axis, the center of gyration is at a radial distance from its axis of *the square root of the half of the sum of the squares of the inner and outer radii of the ring;* thus, if the inner radius of the ring be 20 inches, and the outer radius be 30 inches, the center of gyration will be at a radial distance from the axis of the ring of $\left(\frac{\sqrt{20^2+30^2}}{2}=\right)$ 25.49 inches. The center of gyration is fully explained in most of the Engineer's Pocket Books.

(3.) J. H. W., Vineland, N. J., writes: We brag a good deal about our schools, but none of the principal teachers can tell me how to compute centrifugal force. I don't see the use of school-books if a fellow can't make any practical use of the contents. If you will answer the following question I shall be greatly obliged. What is the centrifugal force per square inch of 100 lbs. of water against the inside of a vertical cylinder 30 inches in diameter, 10 inches high, making 1,000 revolutions per minute, and the simplest rule for computing it for any size, weight and speed? *A.*—As your question is not stated clearly, we put it in the following language, which we think is your meaning. A vertical cylinder, 30" diameter, 10" high, inside, containing 100 pounds of water, revolves at 1,000 revolutions a minute, carrying the water around with it:—what is the pressure of the water in pounds per square inch against the inner surface of the cylinder? The text-book rules for calculating centrifugal force do not meet this case exactly; but a modification of the rules used for determining the forces and motions of water in centrifugal pumps and the "Barker's Mill," gives a rule proved to be practically correct by the well-known action of those machines. *Rule:* Find the velocity in feet per second of the revolving water at the outer radius of the cylinder, and *compute the height in feet of the column, or "head," of water that would give the same velocity per second of fall by gravity.* Then find the weight in pounds of a column of water of one square inch area, and of a length equal to the height of the "head" found, which will give the pressure in pounds per square inch of the water on the inside surface of the cylinder. In the example, the velocity of the water in the cylinder is $\left(\frac{30.x3.1416x1000.}{12.x60.}=\right)$ 130.9 feet per second. The height, or head, of water column, producing this velocity of fall by gravity, is found by dividing the square of the velocity by 64.4. The formula is, $h=\frac{v^2}{2g}=\frac{130.9^2}{2x32.2}=266.07$ feet for the height of the head. The weight of a column of one square inch area, and 266.07 feet in length is (266.07x0.4332 lbs. =) 115.26 pounds, which is the pressure per square inch in pounds of the water against the inside surface of the cylinder.

Business Specials.

50 cts. a line for each insertion under this head.

Jenkins' Patent Gauge Cocks, the best in use. Send to A. W. Cadman & Co., Pittsburgh, Pa., for illustrated circular.

Alfred Wilkinson, Engineer and Mechanical Draughtsman, can be consulted on all matters connected with the economical use of steam; 506 Walnut Street, Philadelphia. Engines indicated, power measured and valves adjusted for best results.

Howard S. Abbot, Attorney at Law and Solicitor of Patents, 617 7th Street, N. W., Washington, D. C. Personal attention given to cases in Patent Office.

Sheet Metal Presses. Ferracute Co., Bridgeton, N.J.

Engines Indicated—Power Measured. W. H. Odell, Box 274, Yonkers, N. Y.

John Douglass, common and fine patterns made to order, also car wheels, working models, and experimental machinery. Shop at 83 Morgan street, near Washington, Jersey City, N. J.

American Watch Tool Co., Waltham, Mass., Whitcomb Watch Makers' Lathes, and Watch Machinery.

See Standard Turbine advertisement in last issue.

Thomas D. Stetson, Patent Solicitor and Expert in Patent Cases, No. 23 Murray Street, New York.

Blowers for all purposes. Exeter Machine Works, 50 Federal Street, Boston.

Repairs to Corliss Engines a specialty. L. B. Flanders' Machine Works, Philadelphia, Pa.

Paper Making Machinery—Makers of above from fibrous material as wood, esparto grass, etc., send address to Joshua Rose, P. O. Box 3306, N. Y. City.

Rules for Engineers, and Removal of Scale in Boilers. Send for Circular. Ranken Scale Co., 50 Federal Street, Boston.

Dixon's Traction Belt Grease. Dixon's Founders' Perfect Wash. Dixon's Plumbago Foundry Facing. Dixon's Graphite Machine Grease. Dixon's Everlasting Graphite Axle Grease. Dixon's Dry American Graphite Perfect Lubricator. Send for explanatory circular to Dixon Crucible Co., Jersey City, N. J.

Manual of Power for Machines, Shafts, and Belts, with the History of Cotton Manufacture in the United States, by Samuel Webber, C. E., copyrighted 1879. Only work of the kind extant; 240 pages. Price $3. Address, the author, Manchester, N. H.

MANUFACTURES.

The Holyoke, Mass., Water Power Company are laying the foundation for boiler house, engine room, blacksmith shop, etc., at their new establishment on Cabot street.

The foundation for Gardner's new mill at Shelburne Falls, Mass., is well under way and progressing rapidly.

A new concern, though a thriving one, is the Greenfield, Mass., Co-operative Manufacturing Company, established in March last. They employ 40 hands and make a line of table cutlery, bread, butcher, and kitchen knives. These goods are sold in New York City, and from thence are distributed all over the country. Their factory is 125 by 25 feet, two stories high, with an addition of one story. The office is 20 by 35 feet. A boiler of 75 horse-power generates the steam, and a 40 horse-power engine furnishes the motive power for the establishment. The company manufacture medium goods, with wood and bone handles, well-made and finely finished, and have a capacity for turning out 30 gross per day.—*Boston Commercial Bulletin.*

The Westinghouse Brake Company have issued a circular which shows that, up to the 20th of July last, the number of Westinghouse automatic brakes fitted or ordered to be fitted on English lines was 456 engines and 2,942 cars; in France, 203 engines and 1,609 cars; in Belgium, 197 engines and 1,241 cars; in Germany, 55 engines and 93 cars; Russia, 26 engines and 51 cars; Holland, 28 engines and 117 cars; New South Wales Government line, 23 engines and 18 cars. In the United States it is used by 130 railways on 2,211 engines and 7,224 cars. With a few on the lines of several other countries, the total is 3,277 and 13,502, while the non-automatic system is fitted on 2,472 engines and 8,812 cars.

The Waterbury (Conn.) Watch Company are erecting a factory for the manufacture of watches, and expect to occupy it about January 1, 1881. This factory is in the form of an L, 150 feet long and 30 wide. A Jerome-Wheelock engine of 150 horse-power will be used to drive the machinery, and a 250 horse-power boiler will supply the steam.

Ambrose Webster, of the American Watch Tool Company, of Waltham, Mass., has the contract for all the machines for the manufacture of the watch.

Charles B. Richards, of the Colt's Armory, Hartford, Conn., has accepted the position of superintendent of the Porter-Allen High Speed Engine Works (Southwark Foundry), Philadelphia. These works are to be enlarged. They are full of orders for large engines.

Colonel Roberts, of Titusville, Pa., who is now erecting an alpaca factory in that city, contemplates, it is said, putting up a woolen mill.

The Kalamazoo, (Mich.), Spring Works are to remove to Chicago. They will employ 125 hands at their new establishment.

Newberry & McMillan and C. H. Buhl, of Detroit, Mich., propose starting a large stove-manufacturing establishment in that city. It will, it is said, be the largest stove manufactory in the West.

Richard Garstang, boiler maker, of St. Louis, is causing to be erected an addition to his boiler works, at an expense of about $2,000, which will add greatly to his facilities for doing work.

The Phœnix Iron Works Co., Ashtabula, Ohio, manufacturers of special machinery, such as friction pulleys, elevators, etc., are very much crowded with work.

An Eastern brass foundry firm, once located in Fall River, Mass., design having works at Lorain, O., Mr. R. H. Penfield, of Elyria, giving the land. The foundry will employ 400 men.

The I. P. Morris Co., Philadelphia, have recently furnished Strong's Feed Water Heater, sizes ranging from 200 to 800 horse power, to Wm. Sellers & Co., M. L. Shoemaker & Co., Tracie Worsted Mills, and Belmont Water Works, Philadelphia; Seaboard Refining Co., Bayonne, N. J.; Brush Electric Light Co., Cleveland, O.; Kehler Bros., and U. S. Engineer Corps, St. Louis, Mo.; Ocean Mills, Newburyport, Mass.; Morse Manufacturing Co., Westerly, R. I.; Chadwick & Co., Boston, and others.

Kilburn & Lincoln, of Fall River, Mass., are erecting a two story building near their foundry on Canal street, 100 by 30 feet, to be used as a pattern shop.

G. M. Benson, Cleveland, manufacturer of stairs machinery, has built a new shop. It is three stories in height, 55x50 feet.

Ground has been broken for the foundation of a pair of fifteen ton shears at Brown, Bonnell & Co.'s rolling mill, Youngstown, O., to be used in shearing sheet plates.

Fenton & Dunn, carriage manufacturers, of Holyoke, Mass., are building a blacksmith shop nearly 100 feet long, of brick, and are also enlarging their paint-shop and lumber-shed.

It is intended that the Wm. Anson Wood Reaper and Mower Works, Youngstown, O., shall be put in operation by the first of December.

A two story, 35x75 feet factory is being erected in Cleveland, O., by the Chisholm Steel Shovel Works. This will increase their capacity to make shovels fully 50 per cent.

Bath, Me., is to have a clothing manufactory, which will turn out 100,000 garments yearly.

The Chicago, Burlington & Quincy Railroad has started to build a branch of its Burlington & Missouri lines in Nebraska, from Blue Springs eastward to the Missouri River. It will be about 75 miles long. Grading is now in progress.

Machinists' and Engineers' Supplies.

NEW YORK, October 28, 1880.

The supply market continues unchanged, business is good for the season, and most of the dealers appear to be pleased with what they are doing.

We hear of no changes in values. Iron pipe continues in good demand, the larger sizes above 2" being somewhat scarce.

Iron Review.

NEW YORK, October 28, 1880.

There are no indications of any improvement in the condition of the pig iron market as reported last week, consequently there is nothing new to report. The transactions during the week have been few. We continue to quote Foundry No. 1, at $25; Foundry No. 2, $20; Grey Forge, $19.50 @$20.50. Manufactured iron also remains the same as last reported.

Carmichael & Emmens, 130 Cedar St., New York, quote prices of Boiler Makers' Supplies from store as follows:

Flange Iron	5¼
C. H., No. 1, Shell Iron	4¼
C. No. 1 Iron	4
Tank Iron	3¾
Sheet Iron	3½
Angle Iron	3½
Bead Iron	5½
Burden Boiler Rivets	5 1-10

Boiler Tubes at 40 per cent. discount off list.

Metal Review.

LUCIUS HART & CO., 8 & 10 Burling Slip, New York, furnish us the following, under date of Oct. 28, 1880:

Since our last report metals have been steady, with fair demand. Pig Tin strong abroad, London, £88 10s.; Singapore, abt. $27. On spot transactions embracing over 500 tons have taken place and market has become more active, with a strong upward tendency. Would quote Banca Tin 24½c.; Malacca and Straits 20½c. to 21c.; Billiton, and Australian, 20c. and upward, English "Lamb & Flag," 19¾c. to 20c. Pig Lead, jobbing from 5c. up, Antimony has weakened to 14c. for ordinary brands, to 15c. for Cookson; Spelter, 5¼c. to 5½c., for Domestic "Bertha," pure, 8c. to 8¼c.; No. 1 Solder, 11c.; "Half and Half 13c.; Bismuth, $2.50 to $3.00.

WANTED.

Wanted—Machinists—Six strictly first-class Vise hands and Fitters accustomed to building machine tools; liberal wages paid by Niles Tool Works, Hamilton, Ohio.

Wanted.—Four first-class salesman well up on steam. Geo. S. Strong, care J. F. Morris Co., Philadelphia, Pa.

Wanted.—A first-class machinist to take contract for building, at our works, a large lot of engine lathes and iron planers. H. B. Smith Machine Co., Smithville, Burlington Co., N. J.

Wanted.—First-rate foundry foreman for general work. Must be used to heavy work in green sand and experienced in all kinds. Temperance and ability to drive while doing good work are requisites. Address with record and salary expected, Foundry, P. O. Box 554 Boston, Mass.

Parties desiring a competent man to superintend the erection of engines or machinery, address J. F. Kingsley, Box 777 Owego, Tioga Co., N. Y.

Machine Shops, Property for Sale.

We will offer at Public Sale, upon the premises at 10 o'clock, Thursday morning, November 25th, 1880, our extensive and well appointed Machine, Boiler, Smithing and Wood Shops in this city, having a capacity for two hundred hands. Sale of the entire property and business, including Patterns, Tools and Fixtures to one purchasing party preferred, but if not so sold, it will then be offered in sub-divisions to suit buyers.

The property and business to be sold is one of the oldest, best established and widely known in Southern Ohio. Terms easy. For further information, address or call on

OWENS, LANE & DYER MACHINE CO.

Oct. 25, 1880. *HAMILTON, OHIO.*

The BEST are CHEAPES

Our New No. 3

FLEETWOOD, and DEXTER-C

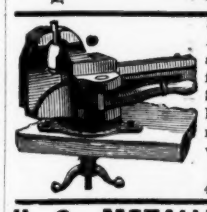
SCROLL SAWS

are unequalled in **Workmanship, Accuracy and Durability.**

Trump Lathe CHUCK, for small Drills, under ¼—3 Jaws—self-centering—accurate, all hardened steel. Price, $1.50 to $2.25.

TRUMP BROS. MACHINE CO.
Wilmington, Del.

GEO. W. FIFIELD,
Manufacturer of **ENGINE LATHES** from 16 to 48 in. swing. Cuts, Photographs and Prices furnished on application. **LOWELL, MASS., U. S. A.**



STEPHENS' PATENT PARALLEL VISE and attachments, adapted to every variety of work from Jewelers' to Locomotive Shops. It opens **further,** holds **firmer, is heavier** and more **durable** than any other vise. For sale by the trade.

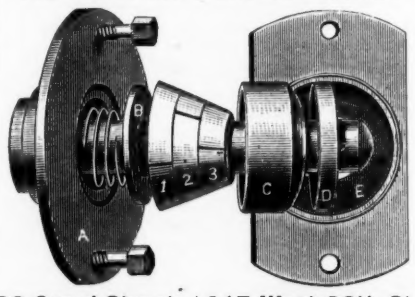
Stephens' Patent Vise Co.
41 Dey St., New York, U. S. A

U. S. METALLIC PACKING CO.

MANUFACTURERS OF

SELF-ADJUSTING STEAM PACKING

FOR MARINE AND STATIONARY ENGINES.

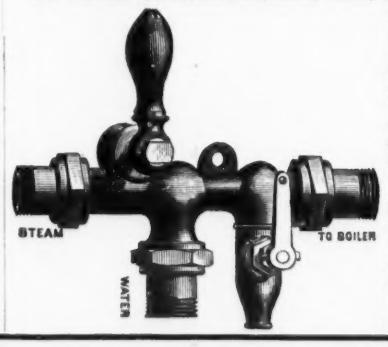


82 Canal Street, BOSTON. | 247 West 38th St. NEW YORK.

WILLIAM COOKE (Successor to COOKE & BEGGS)
6 Cortlandt Street, New York,
AGENT FOR

The Keystone Injector,

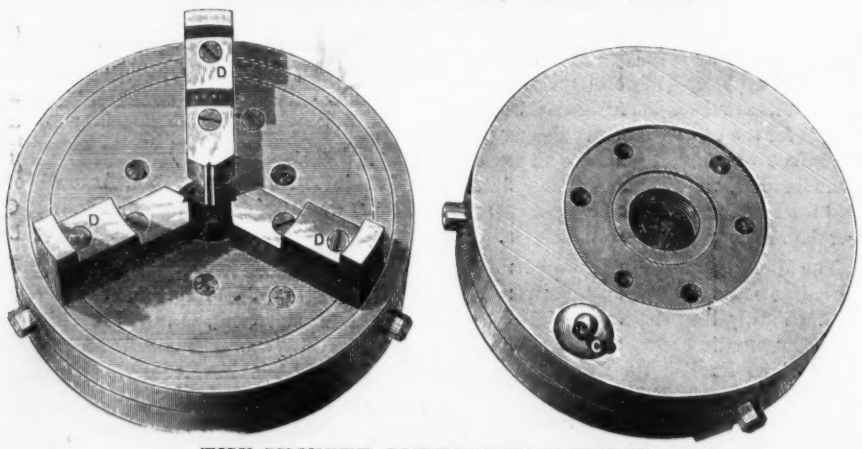
(The Simplest known Boiler Feeder,)
And Dealer in
MACHINERY AND SUPPLIES
Of every description,
For Machinists, Manufacturers, Mills, Mines, Etc.



Send for Price List, and state that you saw this advertisement in this Paper.

Union Manufacturing Co.

96 Chambers Street, New York.



THE SKINNER COMBINATION CHUCK.

This Chuck is **Universal, Independent** and **Eccentric,** and was patented June 24 and November 18, 1879.

We are determined that this Chuck shall be the best in the market, believing that our customers do not want an inferior article, and with the improvements, as shown in the cuts, we have no hesitancy in saying **ours is the best Chuck manufactured,** and **we guarantee every Chuck of this make perfect in every respect.**

All parts will be made **interchangeable,** and in case repairs become necessary, we can furnish the part needed without the Chuck being returned to us, saving much time and expense, **especially on goods sold out of the country.**

We can fill promptly orders for 4, 6, 9 and 12 inch Chucks, with either three or four jaws. Orders for the other sizes will be filled with but little delay.

MORSE TWIST DRILL & MACHINE COMPANY,

NEW BEDFORD, MASS.

Sole Manufacturers of

MORSE PATENT STRAIGHT-LIP INCREASE TWIST DRILL,

Beach's Patent Self-Centering Chuck, Solid & Shell Reamers.

BIT STOCK DRILLS,

Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Beach's Patent Self-Centering Chucks, Center and Adjustable Drill Chucks, Solid and Shell Reamers, Drill Grinding Machines. Taper Reamers, Milling Cutters and Special Tools to order.

All Tools Exact to Whitworth Standard Gauges.

GEO. B. STETSON, Sup't. EDWARD S. TABER, Pres't and Treas.

T. NEW'S PREPARED ROOFING.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents Wanted. T. NEW, 38 John Street, New York.

Mechanical Books.

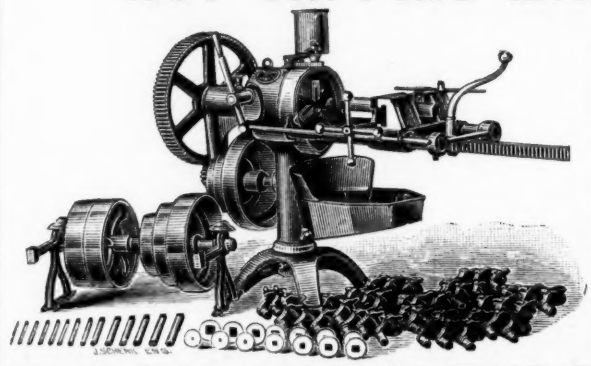
Send 10 cents for 96 page Catalogue of Books for Machinists and Engineers.

D. VAN NOSTRAND,
23 Murray & 27 Warren Sts., New York.

HOWARD IRON WORKS, BUFFALO, N. Y.

MANUFACTURERS OF

Schlenker's Revolving-Die Bolt Cutter AND NUT TAPPING MACHINE.



OUR NEW REVOLVING-DIE MACHINE is now recognized by practical machinists to be the perfection of a Screw Cutting Machine, and we now challenge the world to produce its equal. It possesses many advantages over any competitor. The dies are opened automatically when the desired length of thread has been cut on the bolt, and are closed by the lever, or automatically, as shown in the cut of the machine. It can be changed from one size to another in less than a minute without removing a bolt or pin. It does not require skilled labor, but can be operated by any competent boy. The dies are arranged to open and close automatically, therefore do not require the constant attention of the operator. It is a very rapid worker, its capacity being from 3000 to 3500 ⅝ bolts with 1⅝ inches of thread per day—and larger bolts in proportion. Threads cut by these machines will not vary ½ thread in length on ten thousand bolts. The machines are simple in construction, very compact and strongly built, and are offered much below the price of any other machines capable of cutting the same sizes, and amount of work. It is adapted to cut right and left hand, V thread, square threads, and coach screws,—will take in crooked as well as straight work, and cut any length of bolt. The machines are now largely in use, and we offer them to the trade as one of the most complete machinists' tools in the market. Every machine is warranted as recommended.

HOWARD IRON WORKS, Buffalo, N. Y.

Illustrated Catalogue sent on Application.

KEARNEY & FOOT

Office, No. 78 Chambers Street, N. Y. | **Full Weight Hand-Cut Files.** | Manufactory, PATERSON, N. J.

The best and cheapest in the end. Send for quotations. The files speak for themselves in the following testimonials. Read them.

THE SINGER MANUFACTURING CO.

Messrs. KEARNEY & FOOT, Elizabethport, N. J., July 9th, 1877.

Dear Sirs:—We have for the past ten years used the Files of your manufacture, and during that time we have never had any fault to find with them. We can safely affirm that for evenness of temper, sharpness of cut, accuracy of shape and all other qualities which go to make up a perfect File. They are equal, and in some respects superior, to the best English-made Files. Very Truly, WM. H. INSLEE, Contractor.

Messrs. KEARNEY & FOOT, Elizabethport, N. J., May 3rd, 1877.

Gentlemen:—We have been using your Files, both new and re-cut, for several years, and take pleasure in saying that we have found them a very superior article.

HANS REISE, Contractor, with The Singer M'f'g Co.

We print instructions on the use of Files, and also give the diameters of round and square Files from 3 to 16 inches. They are on card board, 10x12 in., and are intended to be put up in the shop for the men to read. We are pleased to mail them to any manufacturer on receipt of the necessary 6 cents postage.

Respectfully, **KEARNEY & FOOT.**

BETTS MACHINE CO., Wilmington, Del.

MAKERS OF

MACHINISTS' TOOLS,

STANDARD GAUGES, ADJUSTABLE REAMERS, &c.

Slotters, Shapers, Lathes, Punches, Planers, Shears, Column Facers, Car Wheel Borers, Radial Drills, Horizontal Boring AND Drilling Machines, Etc., Etc.

9 IN. SLOTTING MACHINE.

HEAVY PLANERS A Specialty.

Sizes from 24 in. Square to 10 ft. Square.

Send for Photograph.

NICHOLSON FILE CO.

SOLE MANUFACTURERS OF

FILES AND RASPS

HAVING THE INCREMENT CUT.

Also, FILERS' TOOLS and SPECIALTIES.

"Nicholson File Co's" Files and Rasps.
"Double Ender" Saw Files.
"Slim" Saw Files.
"Racer" Horse Rasps.
Handled Rifflers.
Machinists' Scrapers.
File Brushes, File Cards.
Surface File Holders.
Vice File Holders.
Stub Files and Holders.
Improved Butchers' Steels.

Manufactory and Offices at PROVIDENCE, R. I., U. S. A.

NEWARK STEEL WORKS.

BENJAMIN ATHA & CO.

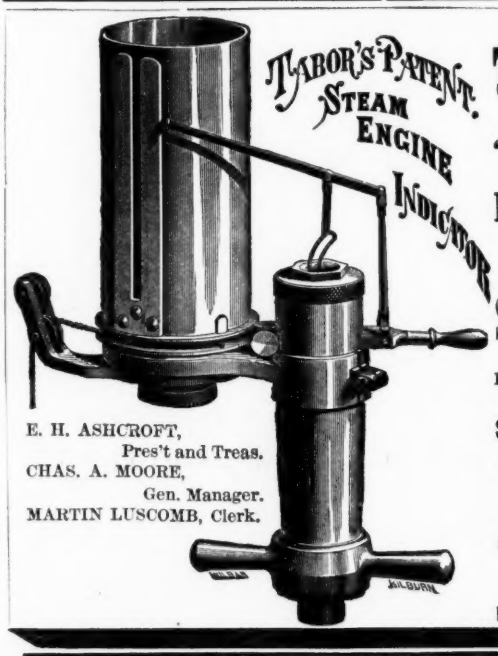
MANUFACTURERS OF

CAST STEEL

WE MAKE GRADES OF STEEL SPECIALLY ADAPTED TO THE MANUFACTURE OF LATHE TOOLS, CHISELS, TAPS & DIES

BENJ. ATHA. NEWARK, NEW JERSEY. J. ILLINGWORTH.

ESTABLISHED 1851.



E. H. ASHCROFT, Pres't and Treas.
CHAS. A. MOORE, Gen. Manager.
MARTIN LUSCOMB, Clerk.

The Ashcroft Manufacturing Co.

Successors to E. H. ASHCROFT,

"Original Steam Gauge Works."

THE E. H. ASHCROFT

Improved "Bourdon" Steam Gauges.

Sole Owners and Manufacturers of

TABOR'S PATENT

STEAM ENGINE INDICATORS.

Specially adapted to

Indicating High Speed Engines and Locomotives.

STEAM AND WATER GAUGES,

Railway, Steamship & Machinery Supplies.

WAREROOMS:

Nos. 51 & 53 Sudbury St., and 8, 10, 11, 12 & 14 Bowker Street,

BOSTON, MASS.

Factories, BOSTON & LYNN.

CAST JACK SCREWS,

With perfect, seamless thread, and hard wearing surface. Special mixture of tough iron. Superior to wrought iron in many respects, and **much cheaper.**

N. B.—Our No. 2 "Handy Bell Jack," 8x1¼ inch, **Price, $2.00,** (see Cut) has lifted 10 tons!

Send for circular.

SEEGER MF'G CO.

MAKERS OF

Press, Stool & Bench Screws,

CLAMPS, &c.

Box 878. Springfield, Mass.

CHRISTIANA MACHINE Co's SPECIALTIES.

PORTABLE BURR MILLS

MILL & FACTORY GEARING.

CIRCULAR SAW MILLS

with improved Ratchet head blocks

STEAM ENGINES.

SHAFTING PULLEYS AND HANGERS.

TURBINE WATER WHEELS

AND MILLING SUPPLIES.

ADDRESS CHRISTIANA, LANCASTER Co. PA.

AKRON IRON COMPANY,

AKRON, O.

SOLE MANUFACTURERS OF

Patent Hot Polished Shafting.

This shafting commends itself to the trade generally as superior to any shafting ever before introduced to the market for the following reasons, viz.:

1st.—It is perfectly straight and round.

2d.—It can be rolled accurately to any desired gauge.

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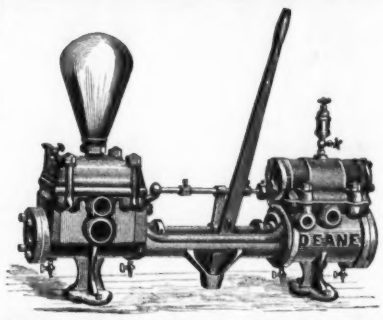

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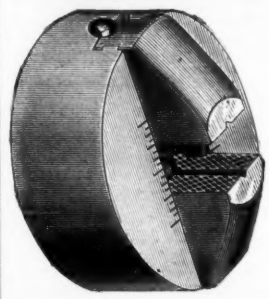

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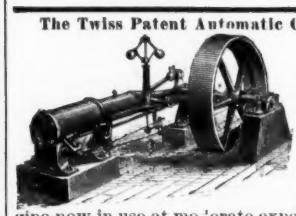

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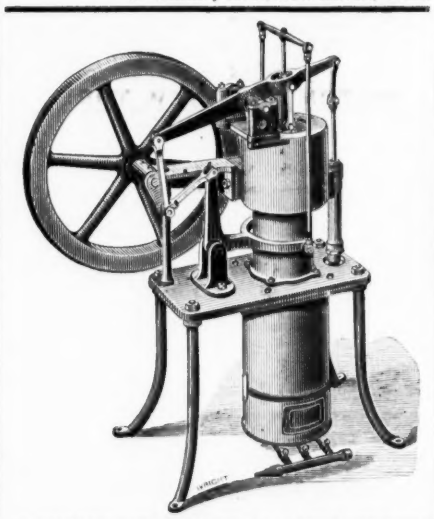

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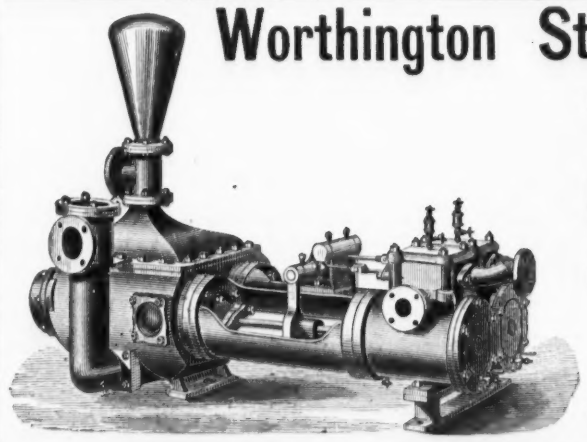

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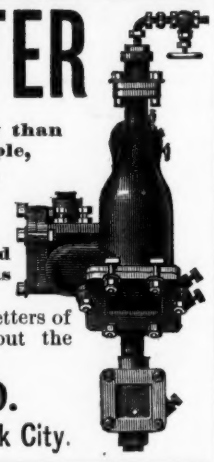

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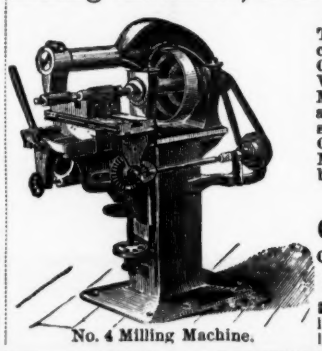

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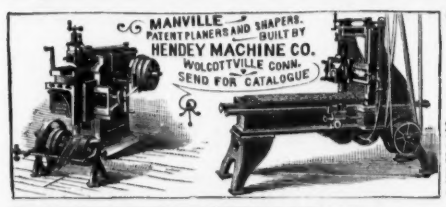

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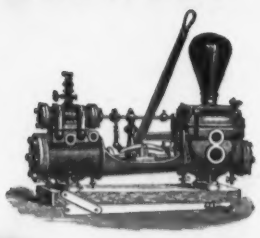

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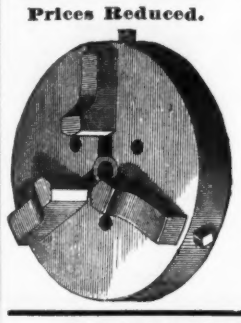

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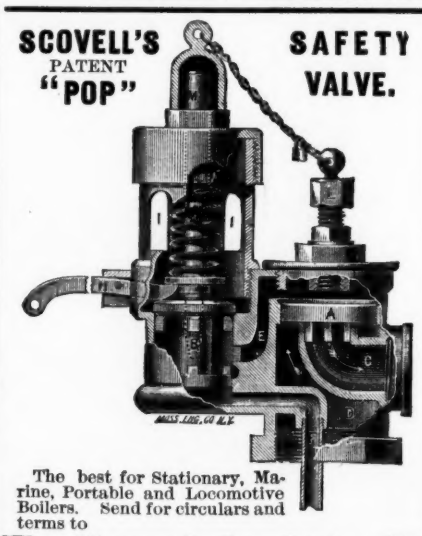

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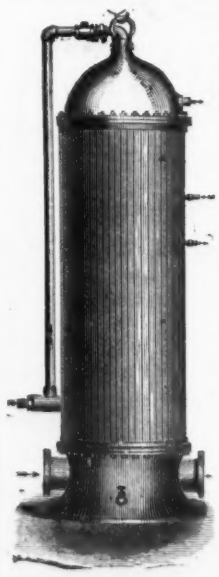

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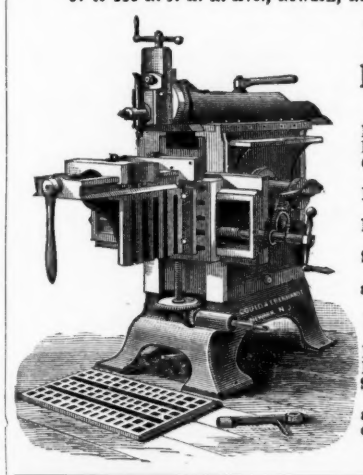

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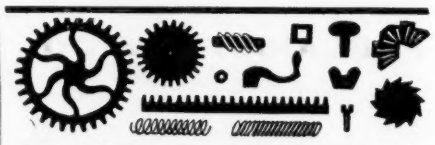

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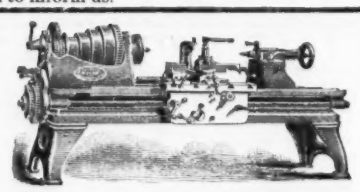

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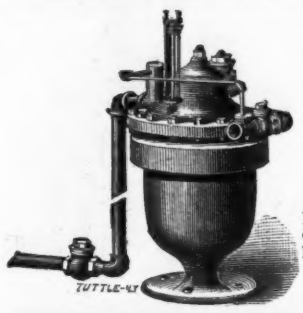

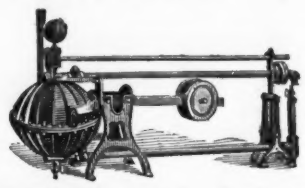

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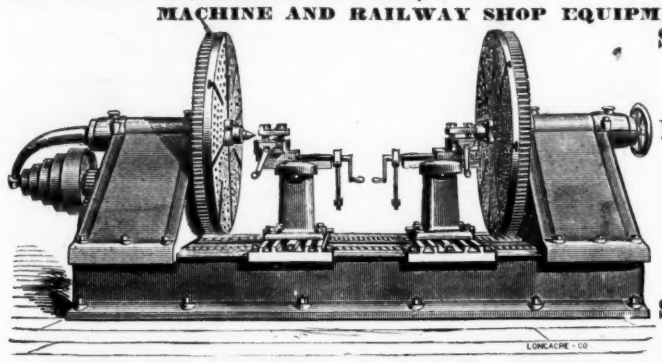

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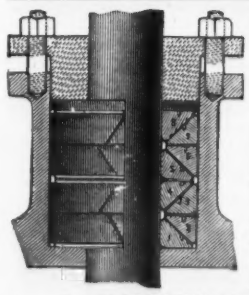

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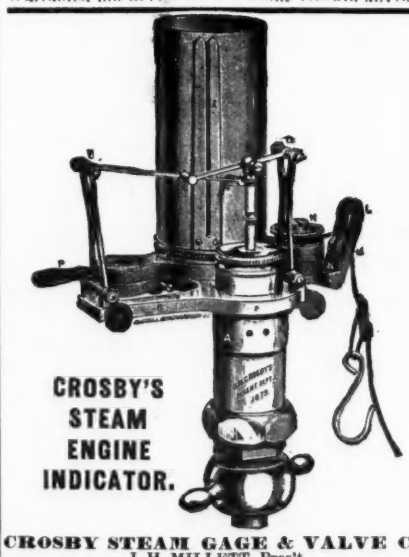

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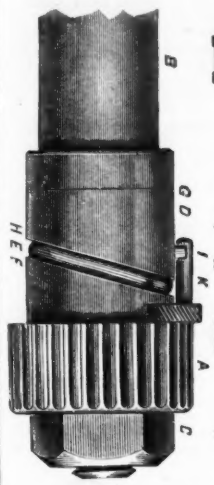

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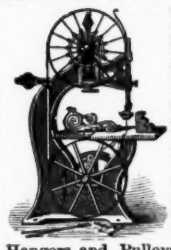

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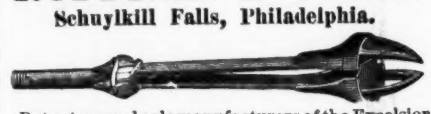

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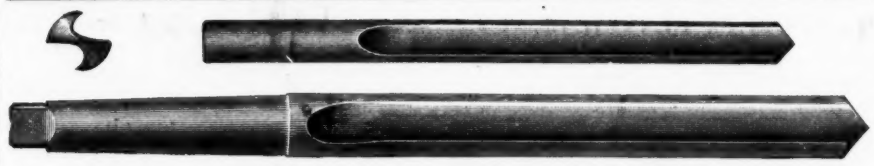

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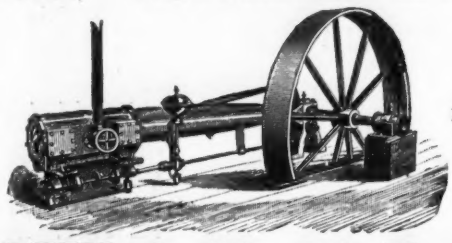

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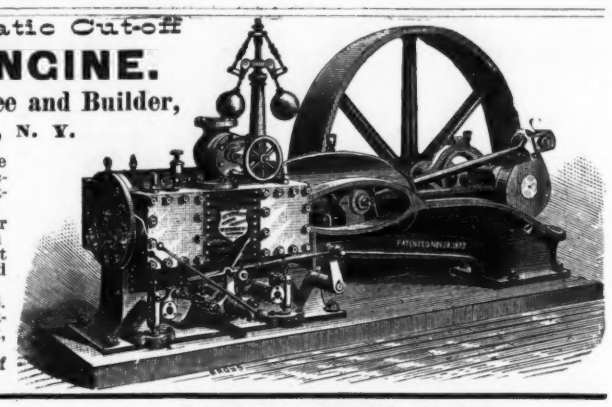

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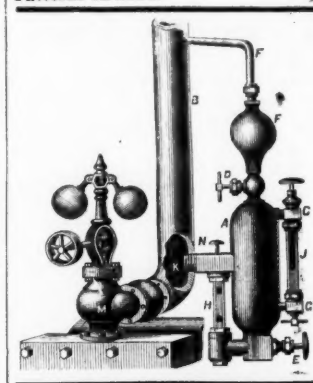

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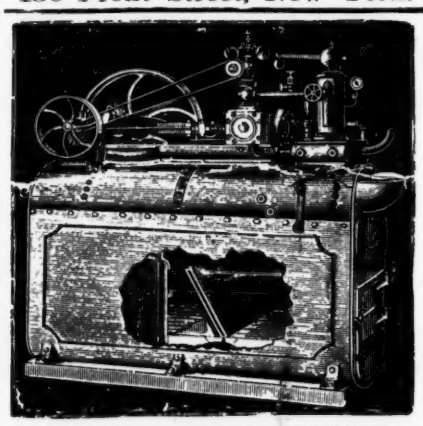

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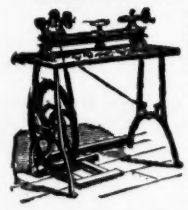

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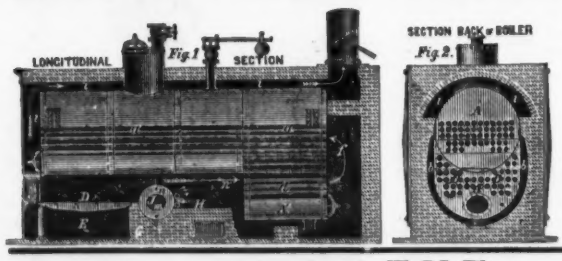

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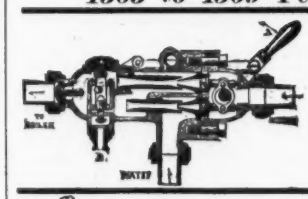

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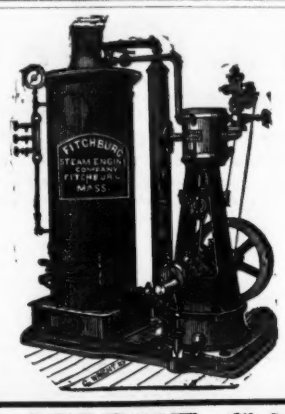

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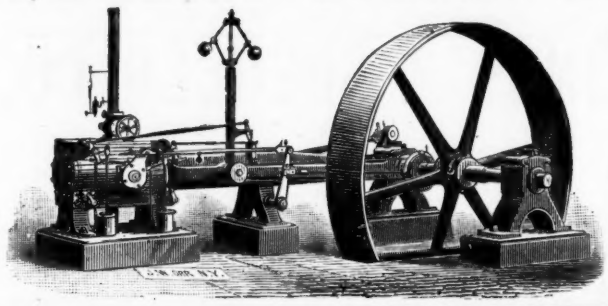

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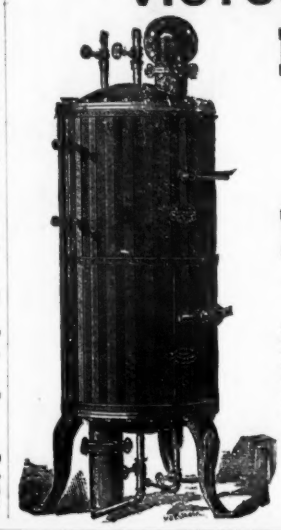

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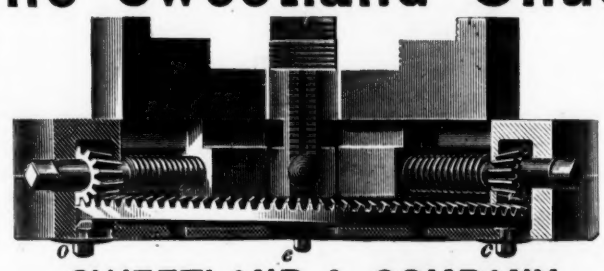

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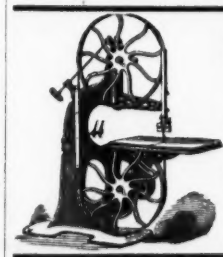

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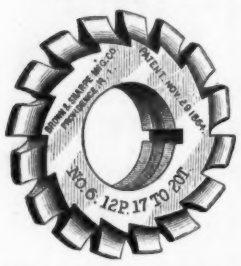

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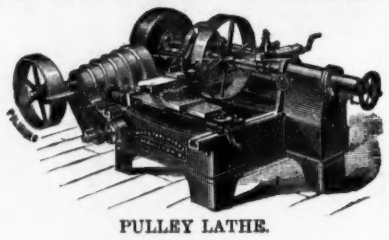

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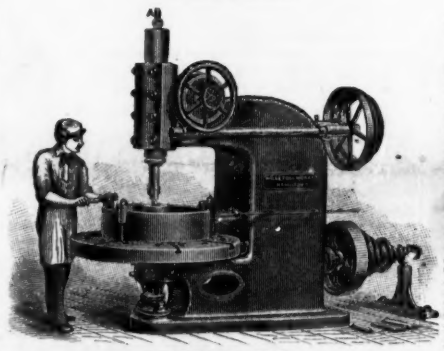

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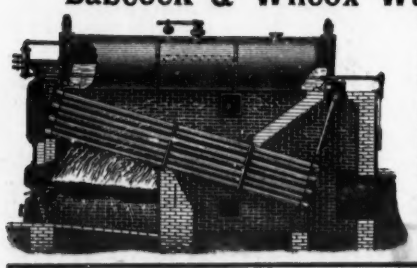

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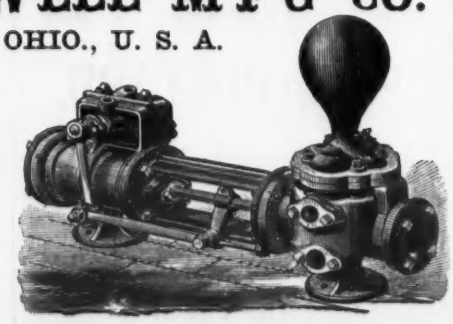

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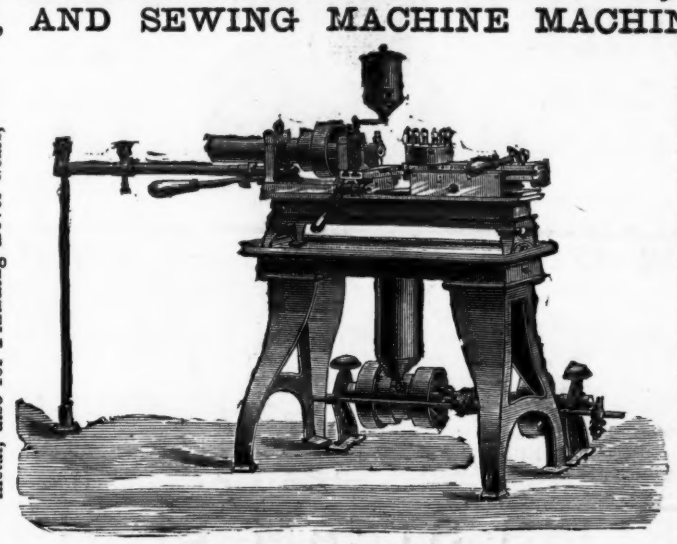

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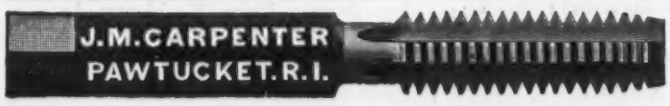

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